MS9740A
Optical Spectrum Analyzer
Remote Control
Operation Manual

13th Edition

- **For safety and warning information, please read this manual before attempting to use the equipment.**
- **Additional safety and warning information is provided within the MS9740A Spectrum Analyzer Operation Manual. Please also refer to this document before using the equipment.**
- **Keep this manual with the equipment.**

ANRITSU CORPORATION

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Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

⚠ DANGER This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

⚠ WARNING This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

⚠ CAUTION This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

MS9740A
Optical Spectrum Analyzer
Remote Control Operation Manual

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About This Manual

This operation manual how to perform remote control of the MS9740A Optical Spectrum Analyzer.

This operation manual assumes that:

- the reader has already read the *MS9740A Optical Spectrum Analyzer Operation Manual* .
- the reader can create C or Basic program.

Refer to the *MS9740A Optical Spectrum Analyzer Operation Manual (M-W3328AE)* for how to connect the power and peripheral equipment, for the panel operations, and the maintenance procedures.

This manual is configured by the following structures: Chapter 1, Chapter 2, Chapter 3, Chapter 4, and Appendix A to E. Read Chapter 1and 2 before using the MS9740A. For Chapter 3 or later, read them as needed.

Chapter 1 Outline

This chapter explains the introduction and main uses for remote control and technical terms used in this manual.

Chapter 2 Before Use

This chapter contains the following information you should read before performing remote control of MS9740A: how to perform setup of MS9740A, how to connect cables, message format, register structure, and synchronous control.

Chapter 3 Sample Program

This chapter explains the sample program operating by Visual C++.

Chapter 4 Message Details

This section explains the remote command messages and rules.

Appendix A to E

These appendixes are reference materials when using the remote control.

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Table of Commands

X.

Chapter 1 Outline

This chapter explains the outline of the remote control, main uses, and glossary.

1.1 About Remote Control

The remote control function sends commands via the communications interface from the remote control PC to set the measuring instrument and read the measurement results and measuring instrument conditions.

The MS9740A Optical Spectrum Analyzer (hereafter, MS9740A) supports the Ethernet interface and GPIB interface. (When the option 001 is installed, the GPIB interface can be used.)

The character strings for controlling the MS9740A are called program messages; the responses from it are called response messages. Program and response messages are both composed of strings of ASCII code. Program messages are divided into two types: command messages for executing settings at the MS9740A, and query messages for reading data from it.

For example, the following command sets the measurement wavelength Center to 1560 nm:

```
CNT 1560
```

A command for reading data from this instrument is called a query message. A query command has the question symbol (?) appended to the string. For example, sending the following command queries the Span set at the instrument.

```
SPN?
```

The controller PC receives the following response against the query message from the instrument.

```
>10
```

This response message indicates that the Span setting is 10 nm.

The front-panel displays and **Local** key operations are still enabled even when the instrument is being remotely controlled. This state calls the panel lock. To disable this panel lock state, press the **Local** key.

1.2 Main Uses for Remote Control

The main uses for remote control are listed below.

Automating Measurements

Instead of key-panel operations, measurement can be automated by controlling the instrument by executing programs.

Remote Control of Instruments

Measuring instruments at remote locations can be controlled over communications lines to collect measurement data.

Controlling Multiple Instruments

The characteristics of multiple DUTs can be measured simultaneously by remote control of multiple instruments.

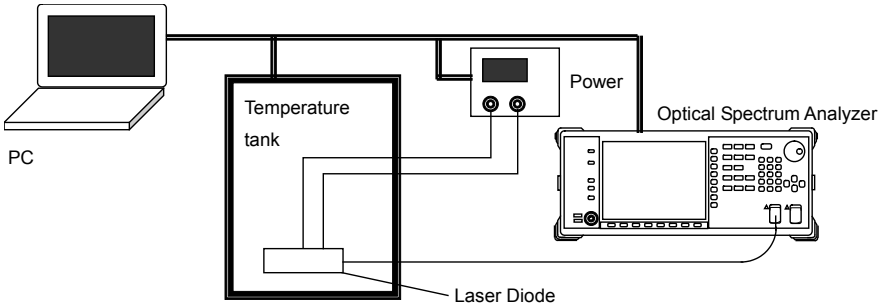


Figure 1.2-1 Example of Controlling Multiple Instruments

Figure 1.2-1 shows an example of controlling multiple instruments. In this example, the wavelength characteristics of an LD are measured with changes in temperature and LD current. The power supply current and temperature chamber temperature are controlled remotely from the PC and the LD wavelength and spectrum data are read by the spectrum analyzer. Table 1.2-1 shows the LD characteristics obtained from the spectrum data for the set temperatures and current.

Table 1.2-1 Measurement Example of LD Measured with Changes in Temperature

Model: Sample-001 Forward Current = 50 mA

Temperature (C°)	Wavelength (nm)	Spectral Width RMS (nm)
–10	1308.1	0.93
0	1309.1	0.92
10	1310.0	0.94
20	1311.0	0.95
30	1311.9	0.94
40	1312.9	0.95
50	1313.8	0.96

1.3 Glossary

Table 1.3-1 indicates what abbreviations are used in this operation manual.

Table 1.3-1 Abbreviation

Abbreviation	Formal name
CR	Carriage Return
ESER	Event Status Enable Register
ESR	Event Status Register
GPIB	General Purpose Interface Bus
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
LAN	Local Area Network
LF	Line Feed
MAV	Message Available summary
MSS	Master Summary Status
SESER	Standard Event Status Enable Register
SESR	Standard Event Status Register
SRER	Service Request Enable Register
STB	Status Byte
VISA	Virtual Instrument Software Architecture

Chapter 2 Before Use

This chapter explains the preparations for using remote control.

2.1 Preparing Equipment

The following equipment is required to perform remote control.

- PC
- Ethernet interface
- Ethernet cable
- GPIB interface (when installing Option 001)
- GPIB cable (when installing Option 001)
- VISA
- Program development tools

Ethernet Interface

Prepare the interface that conforms to the following specifications:

10BASE-T

100BASE-TX

1000BASE-T

Furthermore, use the cable corresponding to each specification.

GPIB Interface

Procure the GPIB interfaces that conform with IEEE 488.2.

VISA

When controlling the MS9740A remotely using the Ethernet port, a VISA*1 driver must be installed in the PC controller. We recommend using NI-VISA™*2 from National Instruments™ (NI hereafter) as the VISA driver.
Although a license is generally required to use NI-VISA™, the licensed NI-VISA™ driver is provided free-of-charge for use when performing remote control*1,*2 of a MS9740A unit in which the MS9740A-001 GPIB option has been installed.
The NI-VISA™ driver can be downloaded from the NI website at:

http://sine.ni.com/psp/app/doc/p/id/psp-411

Be sure to comply with the NI license agreement for the usage and license scope.
Be sure to uninstall the NI-VISA™ driver when disposing of the MS9740A or transferring it to a third party, etc., or when ceasing to use NI-VISA™.

*1: Although the NI-VISA™ driver itself can be downloaded free-of-charge from the web, an implementation license is required

for legal reasons if some requirements are not met. (Check the NI web page for the detailed requirements.)

*2: If these requirements are not met, permission is not granted to use NI hardware and software and an NI implementation license must be purchased. However, since the MS9740A-001 GPIB option incorporates NI hardware (GPIB ASIC), the NI-VISA™ driver can be used free-of-charge.

Glossary of Terms:

- VISA: Virtual Instrument Software Architecture
  I/O software specification for remote control of measuring instruments using interfaces such as GPIB, Ethernet, USB, etc.
- NI-VISA™
  World *de facto* standard I/O software interface developed by NI and standardized by the VXI Plug&Play Alliance.

Trademarks:

- National Instruments™, NI™, NI-VISA™ and National Instruments Corporation are all trademarks of National Instruments Corporation.

Program Development Tools

Prepare some tools for developing and running programs for performing remote control. Refer to the VISA and Interface manuals for the specifications required by the program development tools.

PC

The PC must be able to run the GPIB interface, VISA and program development tools.

2.2 Connecting Equipment

2.2.1 Connecting Ethernet

Connect the Ethernet connector on the rear-panel of the MS9740A and external devices using LAN cables.

Use a LAN crossover cable to connect the MS9740A and an external device. Use a network hub when connecting to multiple external devices.

Note:

Check the network settings of the MS9740A when connecting to multiple external devices

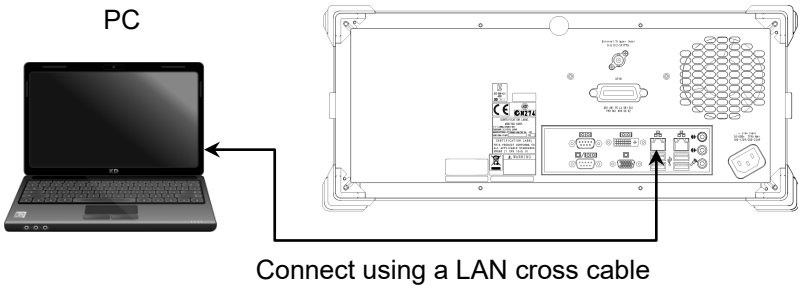


Figure 2.2.1-1 Sample Connection with One External Device

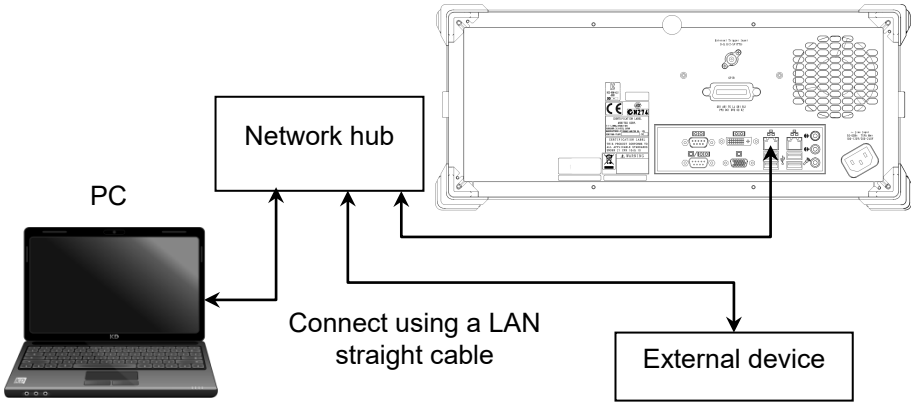


Figure 2.2.1-2 Sample Connection with Multiple External Devices

Note:

External devices may experience difficulty in communicating with the MS9740A, depending on the status of communications between them. A LAN crossover-cable connection is recommended to ensure communication stability.

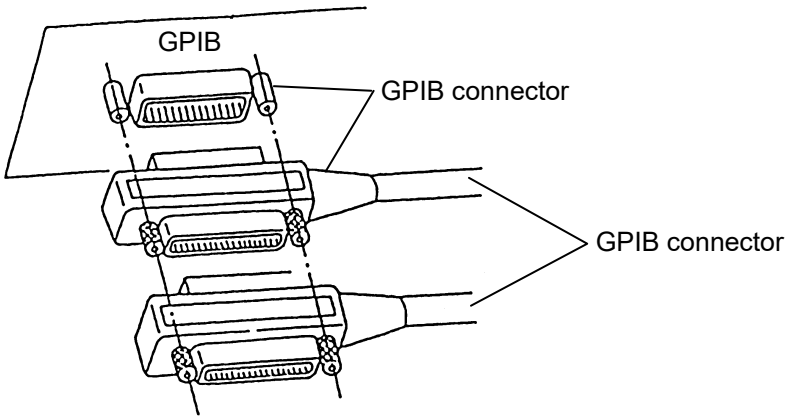
2.2.2 Connecting GPIB

Connect the GPIB connector on the rear panel of the MS9740A and an external device using a GPIB cable.

⚠ CAUTION

Be sure to connect the GPIB cable before turning power on the MS9740A. Connecting it while the power is on may damage internal circuits.

Up to 15 devices, including the external controller (PC), can be connected to one MS9740A unit. Be sure to abide by the conditions shown below when connecting devices.



Total cable length:	Up to 20 m
Cable length between devices:	Up to 4 m
Number of devices that can be connected:	Up to 15

Figure 2.2.2-1 GPIB Cable Connection 1

Connect cables without forming loops.

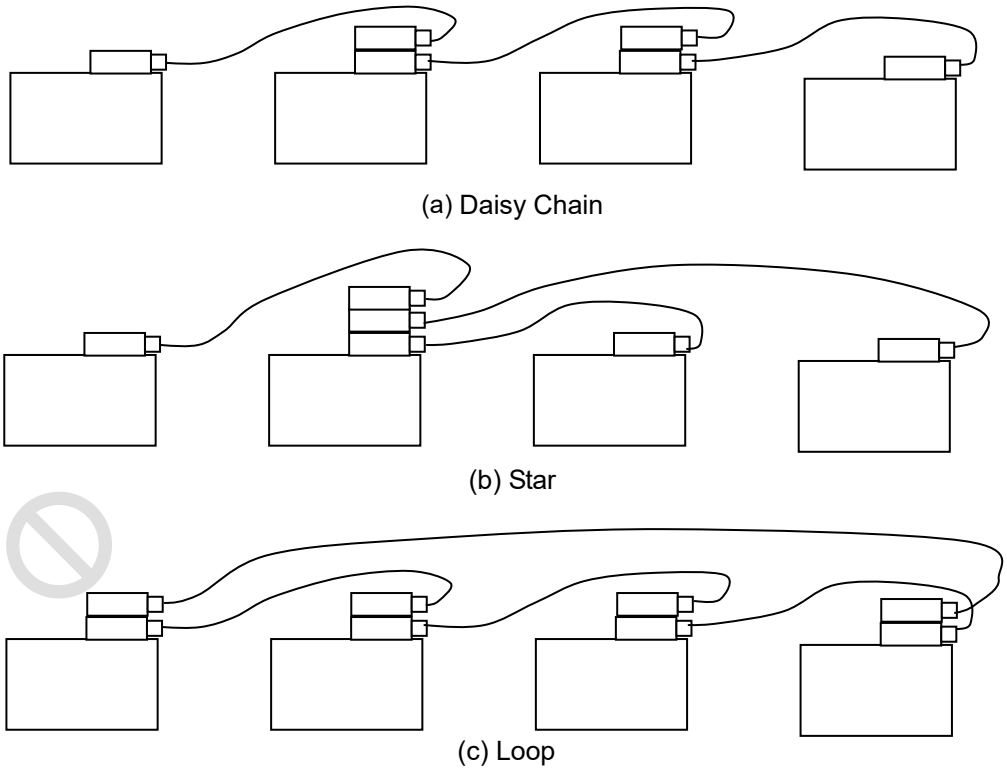


Figure 2.2.2-2 GPIB Cable Connection 2

2.3 Setting Interface

2.3.1 Setting Ethernet

Check the IP address and delimiter.

1. Press **F6** to display Config on the horizontal function keys.
2. Press **f1 Interface Setting**.
3. Open the dialog box to display the MS9740A address in the Ethernet setting IP address.
4. Set the terminator.
   Select **CR/LF**, **LF**, or **None (EOI only)** for Terminator in the Terminator Settings field.

The terminator indicates the end of the sent command.

CR/LF: When two characters, ASCII code 13 (carriage return—CR) and 10 (line feed—LF), received

LF: When one character, ASCII code 10 (line feed) , received

EOI: When signal received from GPIB signal line (End or Identity)

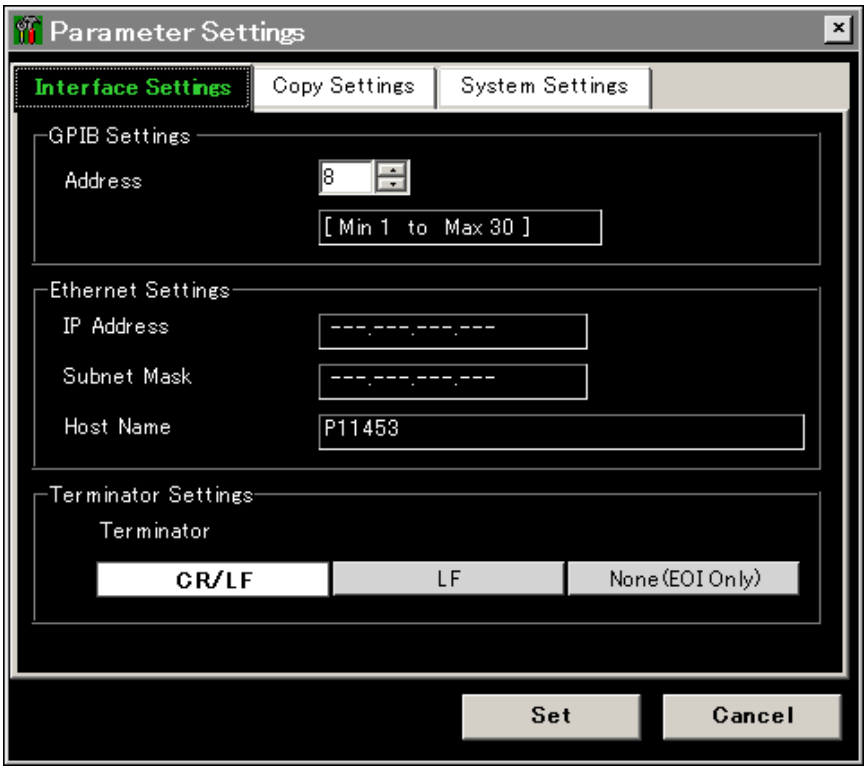


Figure 2.3.1-1 Interface Settings Dialog Box

Connect a keyboard to the MS9740A, when changing the IP address.

For Windows Embedded Standard 2009

1. Press the Windows key on the connected keyboard.
2. Click **Control Panel**.
3. The Control Panel window is displayed, and then double-click **Network Connections**.
4. Right-click **Local Area Connection**, and then click **Properties**.

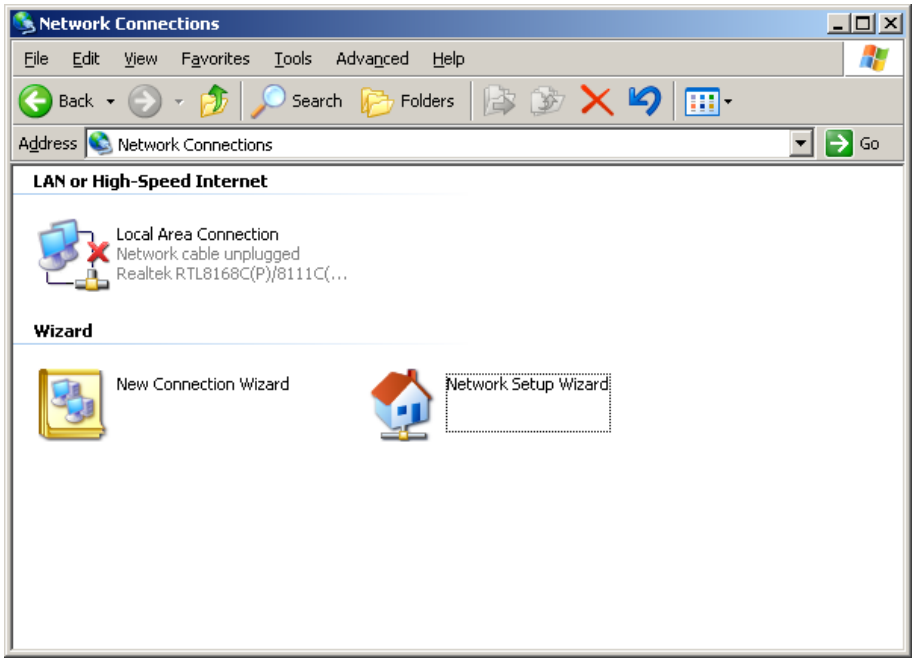


Figure 2.3.1-2 Network Connections Window

5. The Local Area Connection Properties dialog box is displayed.
   On the Local Area Connection Properties dialog box, **Internet Protocol (TCP/IP)** and click **Properties**.

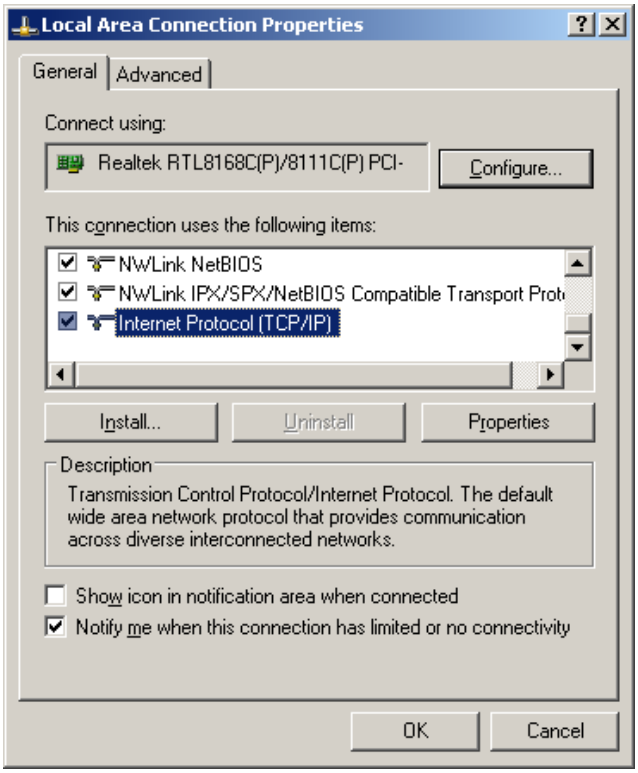


Figure 2.3.1-3 Local Area Connection Properties Dialog Box

6. Check **Use the following IP address**.

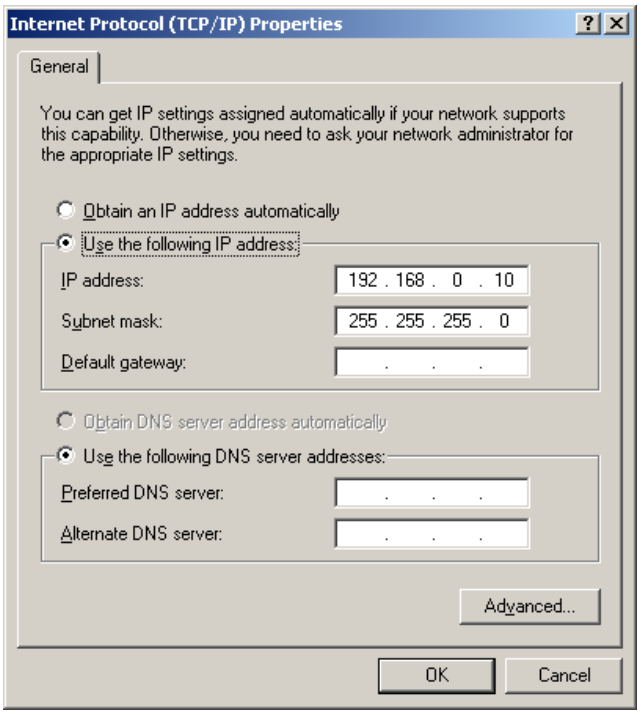


Figure 2.3.1-4 Internet Protocol (TCP/IP) Properties Dialog Box

7. Enter **IP address** and **Subnet mask**.
   When creating a program to control the MS9740A, the IP address input here is required.
8. Click **OK**.
9. Click **OK** on the **Local Area Connection Properties**.

For Windows Embedded Standard 7

1. Press the Windows key on the connected keyboard.
2. Click **Control Panel**.
3. The Control Panel window is displayed, and then double-click **Network and Sharing Center**.

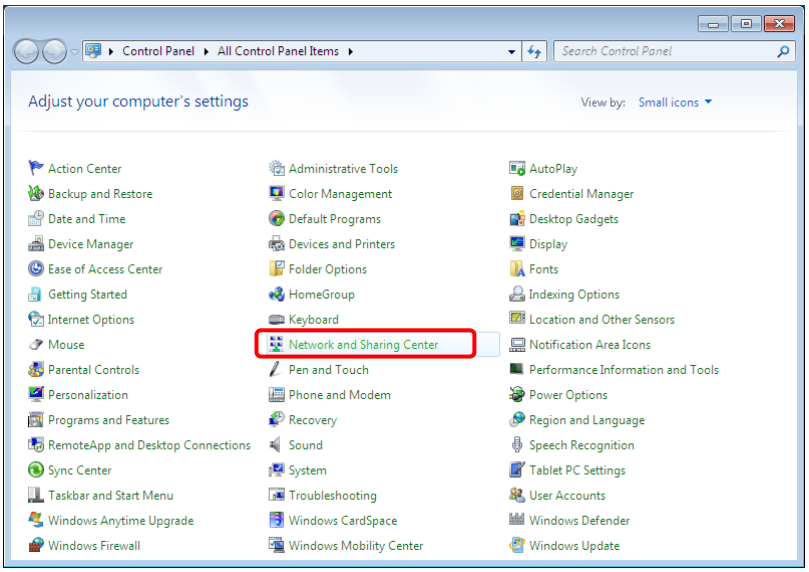


Figure 2.3.1-5 Control Panel Window

4. Click **Channel adapter settings** on the **Network and Sharing Center**.

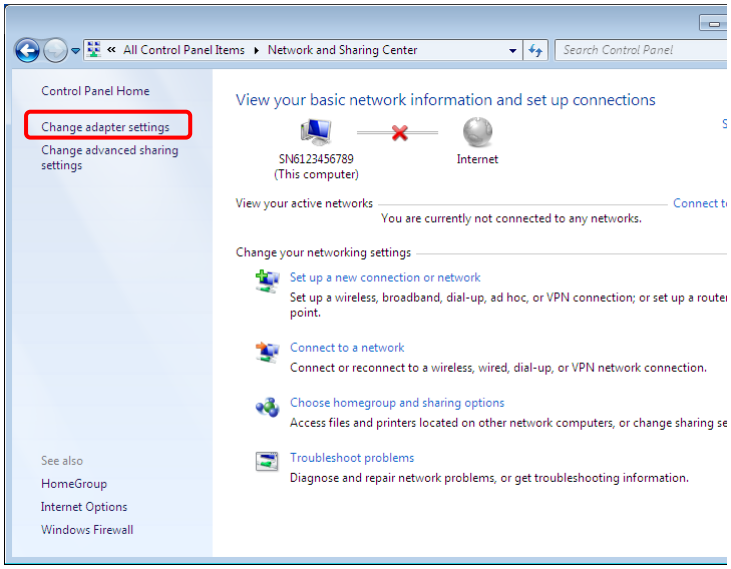


Figure 2.3.1-6 Network and Sharing Center Window

5. Right-click **Local Area Connection 2**, and then click **Properties**.

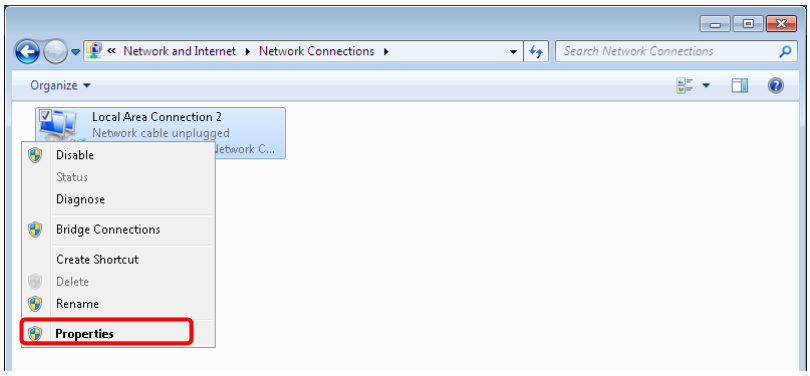


Figure 2.3.1-7 Network Connections Window

6. The Local Area Connection 2 Properties dialog box is displayed. On the list box, click **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.

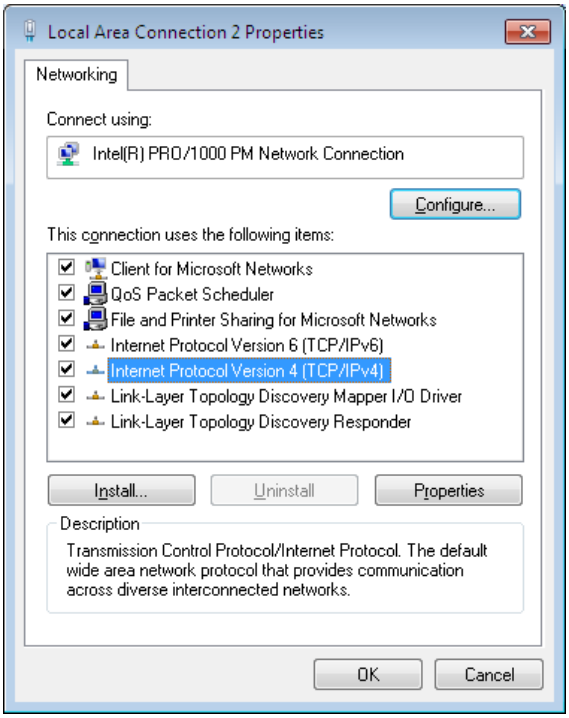


Figure 2.3.1-8 Local Area Connection 2 Properties Dialog Box

7. Select **Use the following IP address**.

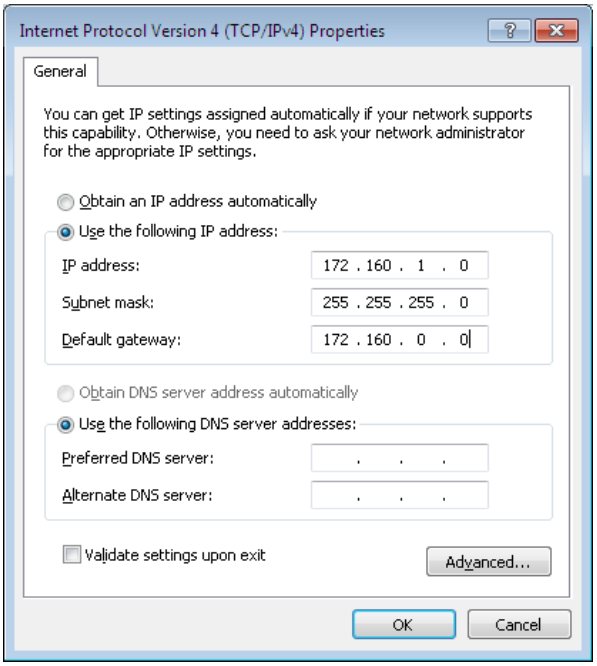


Figure 2.3.1-9 Internet Protocol Version 4 (TCP/IPv4) Properties Dialog Box

8. Enter **IP address** and **Subnet mask**.
   When creating a program to control MS9740A, the IP address input here is required.
9. Click **OK**.
10. Click **OK** on the **Local Area Connection 2 Properties**.

2.3.2 Setting GPIB

Check the MS9740A GPIB address and delimiter with the following procedure.

1. Press **F6** to display Config on the horizontal function keys.
2. Press **f1 Interface Setting**.
3. Open the dialog box. The MS9740A address is displayed in the GPIB setting address.
4. Set the GPIB address in the range from 1 to 30 using the arrow keys or rotary knob.
5. Set the terminator of the response message.
   Select **CR/LF**, **LF**, or **None (EOI only)** for Terminator in the Terminator Settings field.

2.4 Checking Connection

Check that the link between the PC and MS9740A has been established.

When using Ethernet:

1. Click **Programs** at the Windows Start menu.
2. Click **Accessories**.
3. Click **Command Prompt**.
4. Input ping and the MS9740A IP address at the command prompt screen.
   Figure 2.4-1 shows how to set the IP address to 192.168.0.10.

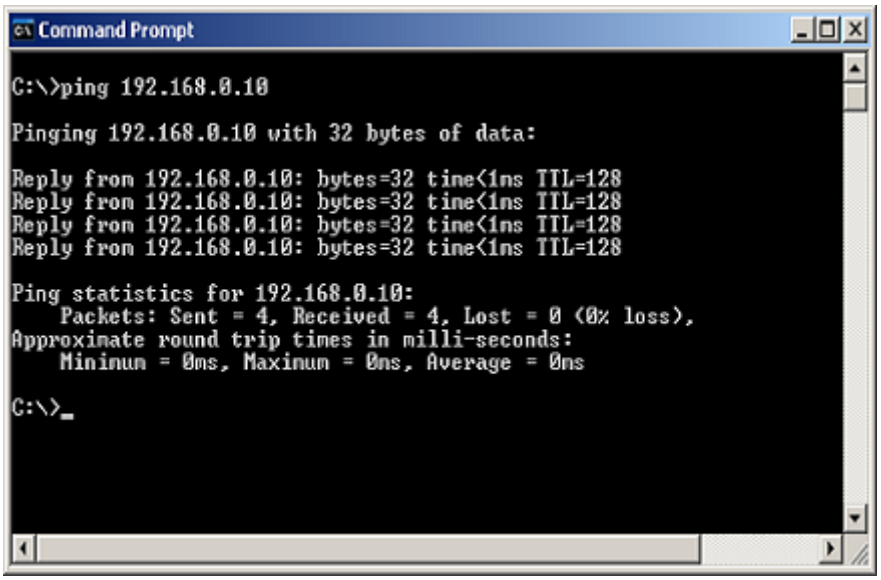


Figure 2.4-1 Example of Ping Command

5. If “Request timed out” message is displayed, the link between the PC and MS9740A has not been connected properly. Check that IP address is correct and cable is connected properly.

When using GPIB

1. Install the software supplied with the GPIB interface.
2. Start the software.
   For the software operation method, refer to the GPIB interface operation manual.
3. Confirm that the address for the displayed instrument is the same as the GPIB address set on the MS9740A.

2.5 Message Format

Messages are composed of character strings for executing commands and character strings indicating the message end. The later character strings are set in 2.3 “Setting Interface”.

Messages are composed of the following types:

Program Messages

Messages sent from PC to instrument

These are composed of commands to set the instrument and queries requesting sending of a response message.

Response Messages:

Messages sent from instrument to PC controller

These messages are composed of header and data parts separated by more than a half width space.

The header is composed of alphanumeric characters and underbars while the head string is alphabetic characters. However, common commands defined by IEEE 488.2 have an asterisk (*) appended to the header string. Both upper and lower-case alphabetic characters are supported.

Command with only header:

```
*RST
AUT
SSI
TER
```

Command with header and data:

```
SPN 10
AVT OFF
```

Messages with multiple data use commas (,) to separate the data parts.

Example:

```
AP WDM,SNR,HIGHER,1,ON
ZMK WL,1310,20
```

Queries have a question mark (?) appended to the header.

Example:

```
DMA?
ZMK? WL
AP? WDM,SNR
```

When linking multiple program messages, separate the message using semicolons (;).

Example: `CNT 1550 ; SSI ; *WAI ; DMA?`

The data format is character string data, numeric data, and binary data.

String data is ASCII code enclosed in quotation marks.
An example of the program message when inputting Model ANR-005 at the title is shown below.

Example: `TTL 'Model ANR-005', TTL "Model ANR-005"`

When using numeric data, input numeric values either as integers or floating point representation. Each following example indicates the same value.

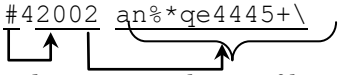
Example:

-90	-90.00	-9E1
1310	1310.0	1.31E3
0.0023	2.3E-4	

For the binary data, the head string starts with a sign (#) and continues with data after a numeric value indicating the data length.

The character after the sign (#) indicates the number of digits in the data length.
The binary data follows the number indicating the data length.

Example: `#42002 an%*qe4445+\`



4 digits 2002 bytes of binary data

2.6 Checking Instrument Status

This instrument has registers indicating the status, such as errors and command execution status. This section explains these registers.

2.6.1 Register Structure

Figure 2.6.1-1 shows the structure of the registers indicating the instrument status.

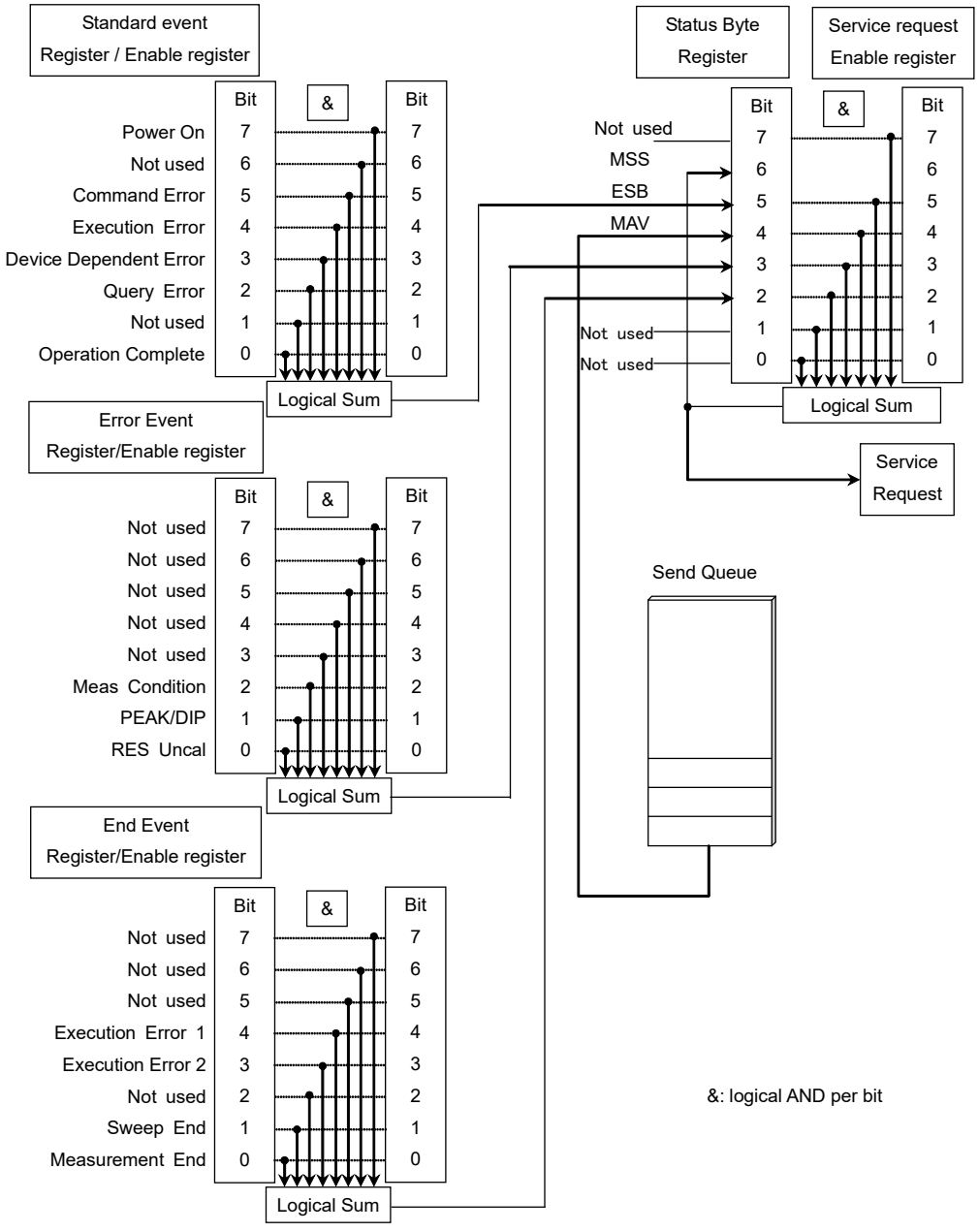


Figure 2.6.1-1 Register Structure

Each register uses 8-bit data. The register output values are the decimal totals for each bit shown in Figure 2.6.1-1.

Table 2.6.1-1 Register Bit Decimal Conversion Values

Bit	Decimal value
7	128
6	64
5	32
4	16
3	8
2	4
1	2
0	1

The service request enable register has a corresponding status byte register. The logical product per bit of these two registers is obtained and the logical sum of this result is output to the MSS (Master Summary Status) bit. When the MSS bit is 1, the data report to the PC controller is displayed on the MS9740A screen; when the MSS bit changes from 0 to 1, an interrupt is generated from the MS9740A to the PC controller. This interrupt is called the service request.

Each standard event register (standard, error, end) has a corresponding enable register. The logical product per bit of the event and enable registers is obtained and the logical sum of this result is output to bit 5, 3 and 2 of the status byte register.

2.6.2 Status Byte Register

The meaning of each bit of the status byte register is shown in the following table.

Table 2.6.2-1 Meaning of Status Byte Register

Bit	Explanation
7	Not used; always 0
6	MSS (Master Summary Register) It is the logical sum of the bit 5 to 0, bit 7 logical product of the status byte register and the service request enable register.
5	This is the logical sum of each bit of the logical product of the standard event status register and standard event enable register.
4	MAV (Message Available summary) This is always 1 when there is a response message in the output queue of this instrument
3	This is the logical sum of each bit of the logical product of the error event register and event enable register.
2	This is the logical sum of each bit of the logical product of the end event register and event enable register.
1	Not used; always 0
0	Not used; always 0

The following methods are used to read the status byte register.

- Using common `*STB?` command
- Using GPIB serial poll (when Option 001 installed)

Read the GPIB interface manual for the serial poll method.
When using serial polling, even if bit 6 is 1, it becomes 0 after reading once.

The `*SRE` and `*SRE?` common commands can be used for setting and reading the service request enable register for setting reading of the status byte register. To output the status byte register data, set the bit corresponding to the service request enable register to 1.

Bits 5, 3, and 2 of the status byte register can be set to 0 using the `*CLS` common command.
When `*CLS` is sent after a command or when a query is sent after `*CLS`, the send queue is cleared and bit 4 is set to 0.

2.6.3 Event Register

Standard Event Status Register

The meaning of each bit of the standard event status register is listed in the table below.

Table 2.6.3-1 Meaning of Standard Event Status Register

Bit	Explanation
7	Power-on Becomes 1 at power-on and returns 0 when read.
6	Not used; always 0
5	Command Error Becomes 1 when received undefined program message, message that cannot executed according to syntax, or message with spelling error
4	Execution Error Becomes 1 when received program message that cannot be executed.
3	Device Dependent Error Becomes 1 at errors other than command, execution and query errors.
2	Query Error Becomes 1 when no data to read in output queue or output queue data fails for some reason.
1	Not used; always 0
0	Operation Complete Becomes 1 when all command operation completed after the *OPC command operation.

Bit 7 to bit 0 of the standard event register can be read by the `*ESR?` command. The standard event register returns to 0 when read.
The standard event register enable register can be set and read using the `*ESE` and `*ESE?` commands. To output standard event register data, set the bit corresponding to the enable register to 1.
The standard event register can be set to 0 using the `*CLS` command.

End Event Register

The meaning of each bit of the end event status register is listed in the table below.

Table 2.6.3-2 Meaning of End Event Status Register

Bit	Explanation
7	Not used; always 0
6	Not used; always 0
5	Not used; always 0
4	End Execution 1 Becomes 1 when calibrating wavelength of resolution and adjusting optical system operations completed.
3	End Execution 2 Becomes 1 when sweep averaging or measuring with power monitor operations completed.
2	Not used; always 0
1	Sweep end Become 1 when sweeping completed.
0	Measurement end Becomes 1 when one of the following commands has been processed: Auto Measurement, analysis using Analysis function, Peak/Dip Search processing, analysis using Application function. To execute multiple commands, send ESR2? for each command to query end event register.

The commands for checking the completion of end event register execution are shown below.

Table 2.6.3-3 Commands for Checking End Event Register Execution

End Event Register Bit	Command
4	`ALIN, AP AMP, CAL, RCAL, WCAL, ZCAL`
3	`PWR, SSI`
1	`SSI`
0	`ANA, AP (DFB|FP|LED|PMD|AMP|WDM|LD), AUT, DPS, PKS, PPC`

The end event register can be read by the `ESR2?`.
The end event register enable register can be set and read using the `ESE2` and `ESE2?` commands. To output end event register data, set the bit corresponding to the enable register to 1.
The end event register can be set to 0 using the *CLS command.
The enable register of the end event register cannot be changed using `*CLS`.

Error Event Register

The meaning of each bit of the error event status register is listed in the table below.

Table 2.6.3-4 Meaning of Error Event Status Register

Bit	Explanation
7	Not used; always 0
6	Not used; always 0
5	Not used; always 0
4	Not used; always 0
3	Not used; always 0
2	Meas-Condition Becomes 1 at mismatch between current measurement condition parameters (Active trace measurement conditions) and result measurement condition parameters
1	Peak/Dip Becomes 1 when level peak or dip not found when peak or dip search executed.
0	RES-Uncal Becomes 1 when resolution setting not appropriate for sweep width and sample count.

The commands for checking the completion of error event register execution are shown in Table 2.6.3-5.

Table 2.6.3-5 Commands for Checking Error Event Register Execution

Error Event Register Bit	Command
2	MPT, RES, CNT, SPN, STA, STO,
1	DPS, PKC, PKL, PKS
0	MPT, RES, SPN, STA, STO

The error event register can be read by the ESR3? .
The error event register enable register can be set and read using the ESE3 and ESE3? commands. To output error event register data, set the bit corresponding to the enable register to 1.
The error event register can be set to 0 using the *CLS command.
The enable register of the error event register cannot be changed using *CLS.

2.7 Controlling Message Sync

There are two message types.

Synchronous message

This message cannot be executed with the next message at the same time while executing the program message.

Asynchronous message

This message can be executed with the next sent message at the same time while executing the program message. The followings are the asynchronous messages for the MS9740A.

```
ALIN, ANA, AP (DFB|FP|LED|PMD|AMP|WDM|LD), DPS, PKS, RCAL,
SSI, WCAL, ZCAL
```

However, if the next message is sent before the previous asynchronous message processing is completed, the message is discarded and the correct measurement conditions will not be obtained.

The following program message executes the single measurement, detects the peak level and its wavelength, and read its wavelength.

```
SSI ; PKS PEAK ; TMK?
```

Figure 2.7-1 shows the message execution sequence when this message is sent to the MS9740A. After executing `SSI`, sweeping starts. As the peak search is executed during sweeping, `PKS PEAK` is executed as well. The read peak level and wavelength during sweeping are sometimes different from those after sweeping.

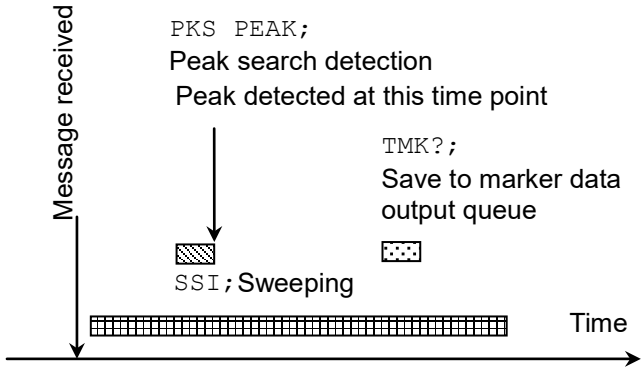


Figure 2.7-1 Message Processing Order

The control for processing the next command after completing processing of the message sent first is called sync control.

Sync control is performed by the following methods.

- Using *WAI command
- Using *OPC? query
- Using *OPC command and *ESR? query
- By querying execution end
- Using ESR2? query

The *WAI command, *OPC? query, *OPC command, and *ESR? query can be used for all messages.

Using *WAI

The *WAI common command instructs processing to wait until processing of the message sent before the *WAI command is completed before executing the next command.

Example: SSI ; *WAI ; PKS PEAK ; TMK?

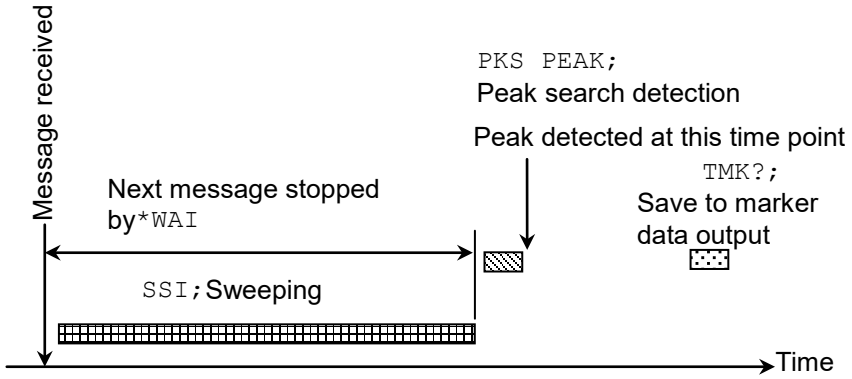


Figure 2.7-2 Sync Control by*WAI

Using *OPC

The *OPC? common command queries the OPC bit indicating the end of message processing.

Examples of Use:

SSI	Executes single measurement
*CLS	Sets OPC bit to 0
*OPC?	Queries OPC bit
> 1	SSI execution completed when 1 received
PKS PEAK	Executes peak search
*OPC?	Queries OPC bit
> 1	PKS PEAK execution completed when 1 received
TMK?	Queries trace marker data

Using *OPC and *ESR?

The *OPC common command sets the standard event status register bit to 1 and displays the OPC bit when completing all command operation.

Examples of Use:

*OPC	Displays OPC bit in Standard Event Status register
*ESR?	Standard Event Status register query
> 0	Returns 0, which means that a command is running.
*ESR?	Standard Event Status register query
> 1	Returns 1, which means that no command is running.

Querying Measurement End

The MS9740A program messages query the end of processing execution. These queries send the following messages after confirming the processing end.

Example of Use:

ALIN	Command of auto alignment execution
ALIN?	Queries result of auto alignment
> 1	Executing adjustment when 1 read
ALIN?	Queries result of auto alignment
> 0	Auto alignment completed when 0 read
SSI	Single measurement

Using ESR2?

The commands in Table 2.6.3-1 set bit of the end event register when execution is completed.

The following messages are sent after confirming the completion of execution when reading the end event register using the `ESE2?` query.

Example of Use:

`*CLS`	Sets OPC bit to 0
`SSI`	Performs single measurement
`ESR2?`	Queries end event register
`> 0`	Executing command when 0 read
`ESR2?`	Queries end event register
`> 2`	Not executing command and SSI execution completed when 1 read
`ANA SMSR,2NDPEAK`	Executes spectrum analysis by SMSR.
`ESR2?`	Queries end event register
`> 0`	Executing command when 0 read
`ESR2?`	Queries end event register
`> 1`	Spectrum analysis by SMSR completed when 1 read.
`PKS PEAK`	Executes peak search
`ESR2?`	Queries end event register
`> 0`	Executing command when 0 read
`ESR2?`	Queries end event register
`> 1`	Peak search completed when 1 read
`TMK?`	Queries trace marker data

Chapter 3 Sample Program

This chapter explains examples of sample programs and how to execute them.

3.1 Executing Sample Programs

3.1.1 Setting Sample Program Operating Environment

The sample program operating environment is as follows.

PC

OS:	Windows XP Professional Service Pack 2
VISA:	NI-VISA Version 4.6
Program tool:	Microsoft Visual C# 2008 Express Edition

MS9740A Optical Spectrum Analyzer

GPIB Address:	1
IP Address:	198.168.0.10
Subnet Mask:	255.255.255.0
Terminator Settings:	CR/LF

Installing NI-VISA

To use VISA at Visual C# 2008, add the following function at installation.

- Development Support .NET Framework 3.5 Language Support
- NI Measurement & Automation Explore —.NET Framework 3.5 Language Support

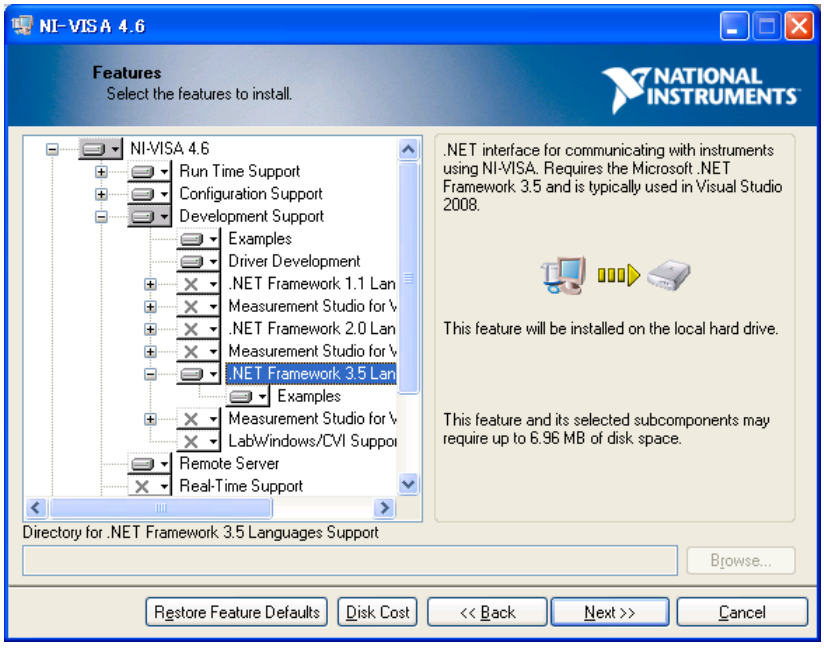


Figure 3.1.1-1 Function Selection Screen at VISA Install

Setting Visual C# 2008

To use VISA at Visual C# 2008, operate as follows.

1. Click **Add Reference** at the Project menu.
2. Click the **.NET** tab in the Add Reference dialog box.
3. Select National Instruments Common and National Instruments VisaNS, and click **OK**.

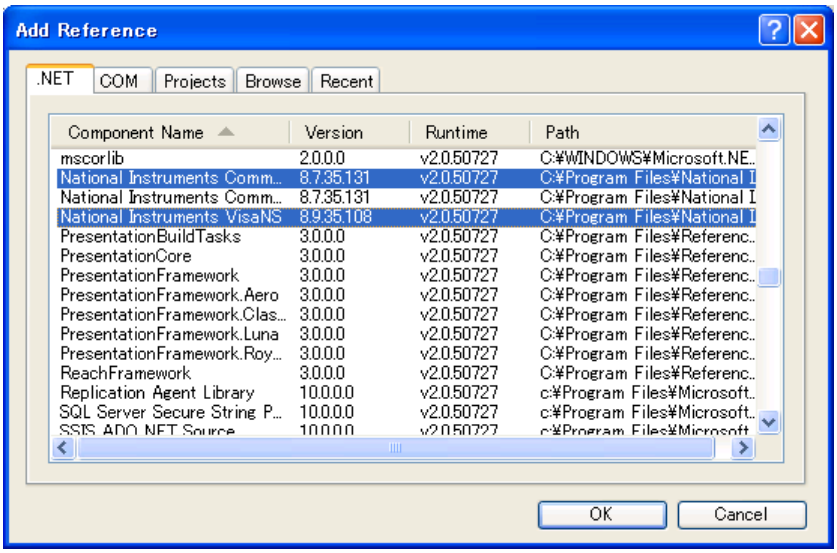
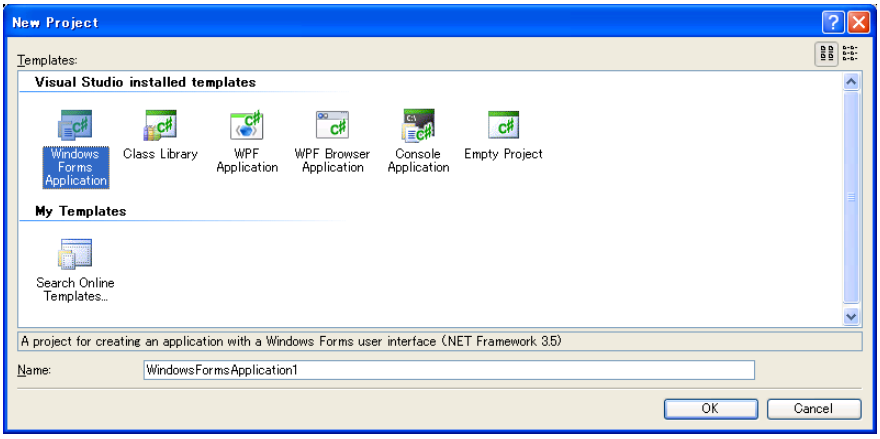


Figure 3.1.1-2 Add Reference Dialog Box

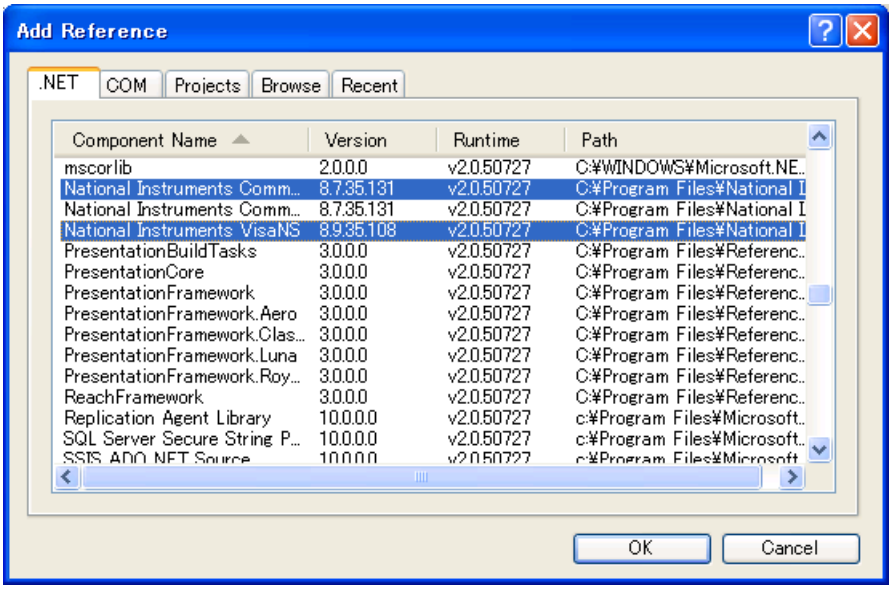
3.1.2 Executing Sample Program

The executing procedure for the sample program is as follows.

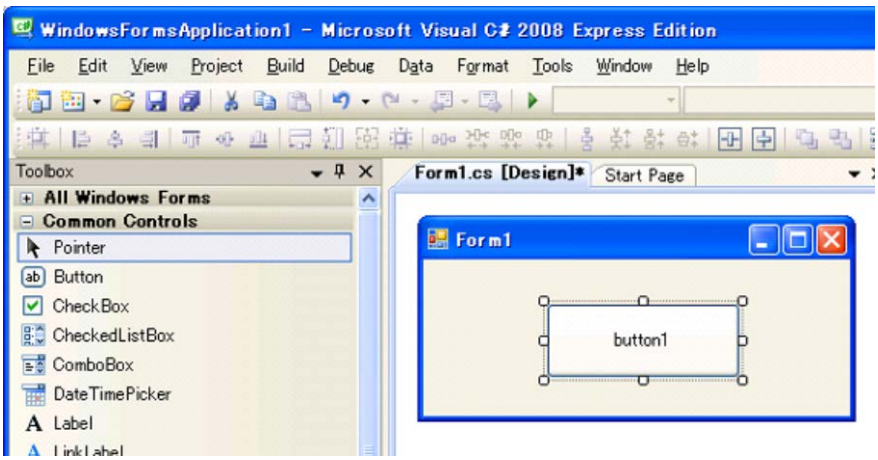
1. Start the Visual C# 2008.
2. Click **New Project** from the File menu.
3. Select the Visual C# Windows Forms Application and click **OK**.



4. Start the screen editor and click **Add Reference** at the Project menu.
5. Click the **.NET** tab in the Add Reference dialog box.
6. Select National Instruments Common and National Instruments VisaNS and click **OK**.



7. Referring to the sample program screen design figure arranges control of the buttons in Form1.cs [Design].



8. Double-click the arranged button to open the screen for inputting the source code.
9. Copy the sample program in this document and paste it into the Form1.cs screen.

```
private void button1_Click(object sender, System.EventArgs e)
{
        //Paste it into this part.
}
```

10. Change the IP address and GPIB address. The part Open ("TCPIP0::192.168.0.10::INSTR"); in the program must be changed to match the operation environment.

    For a LAN connection, the part "192.168.0.10" described above must be changed to the IP address set at the MS9740A.

    For a GPIB connection, the part "TCPIP0::192.168.0.10::INSTR" described above must be changed to "GPIB::1::INSTR" (when MS9740A GPIB address is 1).

11. Click **Open Debug** from the Debug menu.

3.2 Example 1: Adjusting Optical System

This sample program controls the instrument via the Ethernet interface.

Processing Flow

1. Start a session with the MS9740A with IP address setting 192.168.0.10.
2. Since optical axis adjustment takes time, set the receive timeout to 30 s.
3. The optical axis adjustment is executed by the `ALIN1` command.
4. Wait for processing to terminate with `*OPC?` command.
5. The optical axis adjustment is queried by the `ALIN?` command.
6. The results are read on the console.

```
// Open session
NationalInstruments.VisaNS.MessageBasedSession mbs =
  (NationalInstruments.VisaNS.MessageBasedSession)
  NationalInstruments.VisaNS.ResourceManager.GetLocalManager().
  Open("TCPIP0::192.168.0.10::INSTR");

mbs.Timeout = 30000; // Timeout 30sec

// Write alignment command
mbs.Write("ALIN 1");
// Wait for alignment completion
mbs.Query("*OPC?");
// Get result
string ret = mbs.Query("ALIN?");
Console.WriteLine(ret);
```

3.3 Example 2: Measuring Center Wavelength and Spectrum Width

This sample program controls the instrument via the GPIB interface.

Processing Flow

1. Start a session with the MS9740A with GPIB address setting 1.
2. Since single sweeping takes time, set the receive timeout to 30 s.
3. The analysis mode is set to the slice level 3 dB Envelope method by the `ANA EVE`, and `3` command.
4. The single sweep is executed by the `SSI` command.
5. Wait for processing to terminate with `*OPC?` command.
6. The analysis result by Envelop method is queried by the `ANA?` command.
7. The results are read on the console.

```
// Opens session
NationalInstruments.VisaNS.MessageBasedSession mbs =
  (NationalInstruments.VisaNS.MessageBasedSession)
  NationalInstruments.VisaNS.ResourceManager.GetLocalManager().
  Open("GPIB::1::INSTR");

mbs.Timeout = 30000; // Timeout 30sec

// Sets envelope analysis mode
mbs.Write("ANA ENV,3");
// Starts single sweep
mbs.Write("SSI");
// Waits for completion
mbs.Query("*OPC?");
// Acquires result
string ret = mbs.Query("ANAR?");

// Prints result
Console.WriteLine(ret);
```

3.4 Example 3: Reading Trace Data

This sample program controls the instrument via the Ethernet interface.

Processing Flow

1. Start a session with the MS9740A with IP address setting 192.168.0.10.
2. Since single sweeping takes time, set the receive timeout to 30 s.
3. Execute a single sweep using the `SSI` command.
4. Wait until measurement is completed by the `*OPC?` command.
5. Capture the waveform data of Trace Ausing the `DMA?` command.
6. Save the waveform data with the file name trace.txt to the D: drive.

```
// Open session
NationalInstruments.VisaNS.MessageBasedSession mbs =
  (NationalInstruments.VisaNS.MessageBasedSession)
  NationalInstruments.VisaNS.ResourceManager.GetLocalManager().
  Open("TCPIP0::192.168.0.10::INSTR");

mbs.Timeout = 30000; // Timeout 30sec

mbs.Write("SSI");
mbs.Query("*OPC?");
string ret = mbs.Query("DMA?");

// Write to file
System.IO.StreamWriter sr=new System.IO.StreamWriter(
  (new System.IO.FileStream("d:\\trace.txt",
  System.IO.FileMode.Create)),System.Text.Encoding.Default);
sr.WriteLine(ret);
sr.Close();
```

Chapter 4 Message Details

This chapter describes the message details of remote control commands for MS9740A.

4.1 Description of Message Explanations

The following table shows the rules for describing messages.

Table 4.1-1 Rules for Describing Messages

Symbols	Usage
<>	Parameters in angled bracket are input by the programmer.
[]	Parameters in square brackets can be omitted.
|	Select one out of several choices. In the case of A|B|C|D, select one from A, B, C, or D.
{}	Group the choices. In the case of A|B({C|D}), select one from A,B(C) or B(D)
<binary_data>	This string is in binary data format.
<user_drive>	Select one from E,F,G,H,I,J,K,L,M,N,O,P, Q,R,S,T,U,V,W,X,Y,Z.
<file_name>	Character string within 32 characters enclosed by double quotes (" ") \,/,:,*,?,",<,>,|cannot be used . `Example "Sample_LD(201)"`
<numeric_value>	This is a string of numeric code. Example 0,1.2E-6,2.35
<string>	This is a character string data
<switch>	This is a specific selection of message. Example 100KHZ, LEFT
<trace>	Select one from A,B,C,D,E,F,G,H,I,J.

4.2 Correspondence between Panel Operation and Message

This section explains correspondence between panel operation and message.

4.2.1 Panel key

Table 4.2.1-1 shows the corresponding keys to message.
"—" in the following table indicates that there is no corresponding message.

Table 4.2.1-1 Correspondence between Panel Operation and Message

Key name	Command	Query
Center	PKC	—
Ref Lvl	PKL	—
Auto Measure	AUT	AUT?
Center	CNT	CNT?
Copy	PRINT	—
Local	—	—
Log(/div)	LOG	LOG?
Marker Select	MKA MKB MKC MKD TMK DMK EMK	MKA? MKB? MKC? MKD? TMK? DMK?
Peak Search	PKS	PKS? TMK?
Preset	PRE	—
Recall	RCXML	—
Ref	RLV	RLV?
Repeat	SRT	—
Res	RES	RES?
Save*	SVCSV SVCSVA SVXML	—
Single	SSI	—
Span	SPN	SPN?
Stop	SST	—
VBW	VBW	VBW?
Zone Marker	ZMK	ZMK?

*: Refer to Table 4.2.2-2.

4.2.2 Function key

Table 4.2.2-1 and Table 4.2.2-2 show the correspondence between panel key and messages.
There is no corresponding message, if － is indicated in the list item.

Table 4.2.2-1 Correspondence Between Function Key and Message

F1-F8 Key Name	f1-f8 Key Name	Command	Query
Wavelength	Center	CNT	CNT?
	Span	SPN	SPN?
	Peak->Center	PKC	－
	Start	STA	STA?
	Stop	STO	STO?
	MkrValue Wl/Freq	MKV	MKV?
	Value in Air/Vac	WDP	WDP?
Level Scale	Log (div)	LOG	LOG?
	Ref Level	RLV	RLV?
	Peak->RefLevel	PKL	－
	Linear Level	LLV	LLV?
	Opt.Att On/Off	ATT	ATT?
Res/VBW/Avg	Res	RES	RES?
	VBW	VBW	VBW?
	Point Average	AVT	AVT?
	Sweep Average	AVS	AVS?
	Smooth	SMT	SMT?
	Sampling Points	MPT	MPT?
	Act-Res On/Off	ARES	ARES?

Table 4.2.2-1 Correspondence Between Function Key and Message (Cont'd)

F1-F8 Key Name	f1-f8 Key Name	Command	Query
Peak/Dip Search	Peak Search	PKS PEAK	PKS?
	Dip Search	DPS DIP	DPS?
	Off	EMK	—
	Next	PKS NEXT DPS NEXT	—
	Last	PKS LAST DPS LAST	—
	Left	PKS LEFT DPS LEFT	—
	Right	PKS RIGHT DPS LIGHT	—
	Search Threshold Auto/Manual	STHRS	STHRS?
	Search Threshold	STHR	STHR?
	Peak to Peak CalculationOn/Off	PPC	PPC?
Analysis	Threshold	ANA THR	ANA? ANAR?
	ndB Loss	ANA NDB	
	SMSR	ANA SMSR	
	Envelop	ANA ENV	
	RMS	ANA RMS	
	Spectrum Power	ANA PWR	
	Off	ANA OFF	
Trace	Active Trace	TSL	TSL?
	Trace type	TTP	TTP?
	Storage Mode	SMD	SMD?
	Calculation	FML	FML?
	Display On/Off	TMD	TMD?
	Graph	DSP	DSP?
	Erase Overlap	EOV	—

Table 4.2.2-1 Correspondence Between Function Key and Message (Cont'd)

F1-F8 Key Name	f1-f8 Key Name	Command	Query
Application	DFB-LD Test	AP DFB	AP? APR?
	FP-LD Test	AP FP	
	LED Test	AP LED	
	PMD Test	AP PMD	
	WDM Test	AP WDM	
	LD Module Test	AP LD	
	Opt Amp Test	AP AMP	
	Opt Amp (Multi Channel) Test	AP AMP2	
	WDM Filter Test	AP WFIL	
Application (DFB-LD)	Slice Level	AP DFB	AP? DFB
	Side Mode		
	Kσ		
	ndB Width	AP DFB,NDW	AP? DFB,NDW
	Search Resolution	AP DFB,SRES	AP? DFB,SRES
Application (WDM)	Display Mode	AP WDM,MPK AP WDM,SNR AP WDM,REL AP WDM,TBL	AP? WDM,MPK AP? WDM,SNR AP? WDM,REL AP? WDM,TBL
	Signal Parameter	AP WDM,SIGNAL,WL AP WDM,SIGNAL,LV	AP? WDM,SIGNAL,WL AP? WDM,SIGNAL,LV
	Noise Parameter	AP WDM,NOISE AP WDM,NNRMZ	AP? WDM,NOISE AP? WDM,NNRMZ
	Noise Position	AP WDM,NOISE,POINT	AP? WDM,NOISE,POINT

Table 4.2.2-1 Correspondence Between Function Key and Message (Cont'd)

F1-F8 Key Name	f1-f8 Key Name	Command	Query
Application (LD Module)	SMSR Parameter	AP LD,SMSR	AP? LD,SMSR
	Kσ	AP LD,K	AP? LD,K
	ndB Width	AP LD,NDW	AP? LD,NDW
	Search Resolution	AP LD,SRES	AP? LD,SRES
	Signal Parameter	AP LD,SIGNAL,WL AP LD,SIGNAL,LV	AP? LD,SIGNAL,WL AP? LD,SIGNAL,LV
	Noise Parameter	AP LD,NOISE AP LD,NNRMZ AP LD,THR	AP? LD,NOISE AP? DL,NNRMZ AP? LD,THR
	Noise Position	AP LD,NOISE,POINT	AP? LD,NOISE,POINT
Application (Opt Amp Test)	Method	AP AMP,PRM	AP? AMP,PRM
	Parameter	AP AMP,PRM	AP? AMP,PRM
	Write to	AP AMP,MSL	AP? AMP,MSL
	Ext Trigger Delay	TDL	TDL?
	Res Cal	AP AMP,CAL	AP? AMP,CAL
	Pin	AP AMP,PIN	AP? AMP,PIN
	Pout	AP AMP,POUT	AP? AMP,POUT
	Pase	AP AMP,PASE	AP? AMP,PASE

Table 4.2.2-1 Correspondence Between Function Key and Message (Cont'd)

F1-F8 Key Name	f1-f8 Key Name	Command	Query
Application (Opt Amp (Multi Channel) Test)	ISS Method	AP AMP2,PRM	AP? AMP2,PRM
	Channel Parameter	AP AMP2,PRM AP AMP2,WL AP AMP2,SLV AP AMP2,STHR	AP? AMP2,PRM AP? AMP2,WL AP? AMP2,SLV AP? AMP2,STHR
	Opt Amp Test Parameter	AP AMP2,ASE AP AMP2,ASE,POINT AP AMP2,ASE,AREA,FUNC AP AMP2,ASE,AREA AP AMP2,OBPF	AP? AMP2,ASE AP? AMP2,ASE,POINT AP? AMP2,ASE,AREA,FUNC AP? AMP2,ASE,AREA AP? AMP2,OBPF
	Write to	AP AMP2,MSL	AP? AMP2,MSL
	Pin	AP AMP2,PIN	AP? AMP2,PIN
	Pout	AP AMP2,POUT	AP? AMP2,POUT
Application (WDM Filter Test)	Test Parameter	AP WFIL,BWCL AP WFIL,CHDT AP WFIL,LVL AP WFIL,RPS AP WFIL,SLV AP WFIL,STHR AP WFIL,TCL	AP? WFIL,BWCL AP? WFIL,CHDT AP? WFIL,LVL AP? WFIL,RPS AP? WFIL,SLV AP? WFIL,STHR AP? WFIL,TCL
Measure Mode	Dynamic Range	DRG	DRG?
	Ext Trigger Delay	MDM TDL*1	MDM? TDL?
	Interval Time	ITM	ITM?
	Power Monitor	PWR*2 SPC*3	PWR? PWRR?
	MM Mode	MMM	MMM?

*1: TDL sets the Trigger Delay.

*2: Command for starting power monitoring

*3: Command for stopping power monitoring

Table 4.2.2-1 Correspondence Between Function Key and Message (Cont'd)

F1-F8 Key Name	f1-f8 Key Name	Command	Query
Cal	WI Offset	WOFS	WOFS?
	Level Offset	LOFS	LOFS?
	WI Cal(Ext)	WCAL 1	WCAL?
	WI Cal(Ref)	WCAL 2	WCAL?
	Align with Cal	ACAL	ACAL?
	WI Cal(Init)	WCAL 0	WCAL?
	Auto Align	ALIN	—
	Res Cal	RCAL	—
	Auto Cal On/Off	ZCAL*4	ZCAL?*5
	Auto Offset On/Off	AOFS	AOFS?
	Zero Cal	ZCAL	ZCAL?
Marker	λMkr_A	MKA	MKA?
	λMkr_B	MKB	MKB?
	LMkr_C	MKC	MKC?
	LMkr_D	MKD	MKD?
	TMkr	TMK	TMK?
	ΔMkr	DMK	DMK?
	Erase	EMK	—
Zone Marker	Zone Center	ZMK WL	ZMK WL
	Zone Width	ZMK WL	ZMK WL
	Zone->Span	ZMK SPN	—
	Zoom Out/In	ZMK ZOOM	ZMK ZOOM
	Erase	ZMK ERS	—
Others	Optical Output On/Off	OPT	OPT?
	Title	TTL TER	TTL?

*4: Auto Cal On/Off cannot be set by the remote control.
For details, refer to ZCAL in 4.4.2 "Instrument dependent commands".

*5: Auto Cal On/Off settings cannot be queried by the remote control.
For details, refer to ZCAL in 4.4.2 "Instrument dependent commands".

Table 4.2.2-1 Correspondence Between Function Key and Message (Cont'd)

F1-F8 Key Name	f1-f8 Key Name	Command	Query
Config*6	Interface Settings	DELM TRM	DELM? TRM?
	Copy Settings	COLOR PMOD	COLOR? PMOD?
	System Settings	BUZ	BUZ?
	System Info	—	SYSINFO?
	Option Info	—	*OPT?
	File Operation	• Copying file CPCOPYDAT CPCSV CPSYSINFO CPXML • Deleting file DELCOPYDAT DELCSV DELSYSINFO DELXML • Moving file MVCOPYDAT MVCSV MVSYSINFO MVXML • File protect PRTCOPYDAT PRTCSV PRTSYSINFO PRTXML	• Querying file list LISTCOPYDAT? LISTCSV? LISTSYSINFO? LISTXML? • Querying file protect PRTCOPYDAT? PRTCSV? PRTSYSINFO? PRTXML?
	Software Install	—	

*6: Before using the Config screen message, send SYS CONFIG,ACT.
Refer to 4.3.2 "System Management and Measurement Commands".

Table 4.2.2-2 Correspondence Between Function Key and Message

Panel key	f1-f8 Key Name	Command	Query
Preset	Preset	PRE	—
Save	Device	SVCSV SVXML	—
	Save CSV All Data	SVCSVA	—
	Save CSV	SVCSV	—
	Save XML	SVXML	—
Recall	Device	RCXML	—
	Recall XML	RCXML	—

4.2.3 Messages with No Corresponding Panel Operation

Command messages with no corresponding panel operation are listed below.

Table 4.2.3-1 Messages with No Corresponding Panel Operation

Message	Details
*CLS	Clears event register
*ESE	Sets/queries standard event enable register
*ESR	Queries standard event register
*IDN	Queries device information
*OPC	Sets/queries bit display indicating message processing completion
*RST	Initializes MS9740A setting conditions
*SRE	Sets/queries service request enable register
*STB	Queries status byte register
*TST	Queries results of self-diagnosis
*WAI	Waits previous sent message completion
DBA	Queries trace A data (binary format)
DBB	Queries trace B data (binary format)
DBC	Queries trace C data (binary format)
DBD	Queries trace D data (binary format)
DBE	Queries trace E data (binary format)
DBF	Queries trace F data (binary format)
DBG	Queries trace G data (binary format)
DBH	Queries trace H data (binary format)
DBI	Queries trace I data (binary format)
DBJ	Queries trace J data (binary format)
DCA	Queries trace A wavelength and measurement point
DCB	Queries trace B wavelength and measurement point
DCC	Queries trace C wavelength and measurement point
DCD	Queries trace D wavelength and measurement point
DCE	Queries trace E wavelength and measurement point
DCF	Queries trace F wavelength and measurement point
DCG	Queries trace G wavelength and measurement point
DCH	Queries trace H wavelength and measurement point
DCI	Queries trace I wavelength and measurement point
DCJ	Queries trace J wavelength and measurement point

Table 4.2.3-1 Messages with No Corresponding Panel Operation (Cont'd)

Message	Details
DMA	Queries trace A data (text format)
DMB	Queries trace B data (text format)
DMC	Queries trace C data (text format)
DMD	Queries trace D data (text format)
DME	Queries trace E data (text format)
DMF	Queries trace F data (text format)
DMG	Queries trace G data (text format)
DMH	Queries trace H data (text format)
DMI	Queries trace I data (text format)
DMJ	Queries trace J data (text format)
DQA	Queries trace A data (comma-delimited text format)
DQB	Queries trace B data (comma-delimited text format)
DQC	Queries trace C data (comma-delimited text format)
DQD	Queries trace D data (comma-delimited text format)
DQE	Queries trace E data (comma-delimited text format)
DQF	Queries trace F data (comma-delimited text format)
DQG	Queries trace G data (comma-delimited text format)
DQH	Queries trace H data (comma-delimited text format)
DQI	Queries trace I data (comma-delimited text format)
DQJ	Queries trace J data (comma-delimited text format)
ERR	Queries error code
ESE2	Sets/queries end event enable register
ESE3	Sets/queries error event enable register
ESR2	Queries end event register
ESR3	Queries error event register
GHC	Queries screen data
LVS	Queries whether the level scale is log or linear
MOD	Queries measurement mode
PPMK	Obtains Peak to Peak level of trace.
SOFTVER	Queries the software version.
SYS	Switches/queries measurement commands and system commands
WSS	Simultaneously sets/queries start and stop wavelength.

4.3 Message Function Category

4.3.1 IEEE488.2 Common Messages and Native Messages

The device messages are classified by the IEEE488.2 common commands and instrument dependent commands.

IEEE488.2 Common Commands and Queries

The device messages are specified by IEEE488.2-1992. The header first letter of these messages is an asterisk symbol (*).
Common messages and queries are defined as required or optional by IEEE standard.
The common messages used with this instrument are only the messages defined as obligatory by the standard.

Native Messages

These are the device messages required for the panel operations and measurement functions of this instrument.

4.3.2 System Management and Measurement Commands

The device messages used by this model are divided into system management commands, measurement commands, and neutral commands that can be used anytime.
This machine has a system management mode and a measurement mode. The mode must be switched (SYS command) for to the type of command to use.

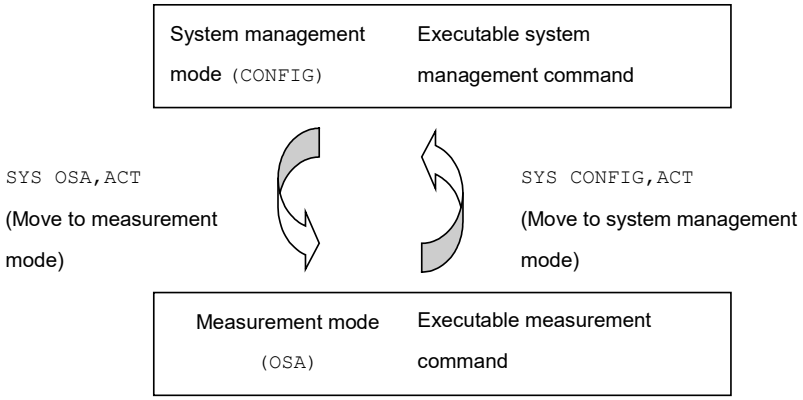


Figure 4.3.2-1 Switching System Status

System Management Command

System management commands are the device messages corresponding to the operations set at the **F6 Config** screen. There are commands for the following operations. These commands are listed in Table 4.3.2-2.

- Listing, saving, copying, deleting, moving and protecting of files
- Reading software version and option information
- Setting communications interface and buzzer

To use system management commands, send `SYS CONFIG,ACT.` Measurement commands cannot be used during this time.

Measurement Commands

Measurement commands are the device messages for the measurement functions of the optical spectrum analyzer.
To use measurement commands, send `SYS OSA,ACT.` System management commands cannot be used during this time. These commands are listed in Table 4.3.2-3.

Neutral Commands

Neutral commands for switching between system management commands for saving IEEE488.2 common device messages, saving screen image files and initializing parameters, and measurement commands do not belong to either system management commands or measurement commands. These commands can be used at any time. These commands are listed in Table 4.3.2-1.

The following commands can be used at any time.

Table 4.3.2-1 Neutral Commands

*CLS	*STB
*ESE	*TST
*ESR	*WAI
*IDN	PRE
*OPC	PMOD
*OPT	PRINT
*RST	SYS
*SRE	

The following system management commands can be used after sending `SYS CONFIG,ACT`.

Table 4.3.2-2 System Management Command

BUZ	LISTSYSINFO
COLOR	LISTXML
CPCOPYDAT	MVCOPYDAT
CPCSV	MVCSV
CPSYSINFO	MVSYSINFO
CPXML	MVXML
DELCOPYDAT	PRTCOPYDAT
DELCSV	PRTCSV
DELM	PRTSYSINFO
DELSYSINFO	PRTXML
DELXML	SOFTVER
LISTCOPYDAT	SYSINFO
LISTCSV	TRM

The following measurement commands can be used after sending SYS OSA,ACT.

Table 4.3.2-3 Measurement Commands

ACAL	DCI	ESE3	SRT
ALIN	DCJ	ESR2	SMD
AOFS	DMA	ESR3	SMT
ANA	DMB	GHC	SPC
ANAR	DMC	FML	SPN
AP	DMD	ITM	SRT
APR	DME	LLV	SSI
ARES	DMF	LOFS	SST
ATT	DMG	LOG	STA
AUT	DMH	LVS	STHR
AVS	DMI	MDM	STHRS
AVT	DMJ	MKA	STO
CNT	DMK	MKB	SVCSVA
DBA	DPS	MKC	SVCSV
DBB	DSP	MKD	SVXML
DBC	DQA	MKV	TDL
DBD	DQB	MPT	TER
DBE	DQC	MMM	TMD
DBF	DQD	MOD	TMK
DBG	DQE	OPT	TSL
DBH	DQF	PKC	TTL
DBI	DQG	PKL	TTP
DBJ	DQH	PKS	VBW
DCA	DQI	PPC	WCAL
DCB	DQJ	PPMK	WDP
DCC	DRG	PWR	WOFS
DCD	DSP	PWRR	WSS
DCE	EMK	RCAL	ZCAL
DCF	EOV	RCXML	ZMK
DCG	ERR	RES	
DCH	ESE2	RLV	

4.4 Device Message Details

4.4.1 IEEE488.2 Common Message

This subsection describes the IEEE 488.2 common messages supported by MS9740A.

*CLS [Clear Status]

Function

1. The `*CLS` common command clears the following registers.
   - Standard event status register
   - Extended event status register
   - Error event register

   Therefore, bits 5, 3, and 2 of status byte register become 0.
   The setting value of each enable register does not vary depending on `*CLS`.
2. The `*CLS` common command clears the status byte register when sent before the query after the program message terminator.
   All unread messages in the output queue are cleared at this time.

   The relevant message example indicates below.

```
CNT 1305.8
SPN 1000
CNT?
*CLS
```

Syntax

```
*CLS
```

*ESE [Event Status Enable]

Function

This command sets the standard event status enable register.
The setting of 0 to 255 is equivalent to 8-bit binary.
The standard event status mask bit is set to 0.
The command queries the standard event status enable register value.

Syntax

```
*ESE <numeric_value>
*ESE?
```

<numeric_value> = bit0 + bit1 + bit2 + bit3 + bit4 + bit5 + bit6 + bit7

bit7 : 2^7 = 128	Power-on
bit6 : 2^6 = 64	Not used
bit5 : 2^5 = 32	Command error
bit4 : 2^4 = 16	Execution error
bit3 : 2^3 = 8	Unique device error
bit2 : 2^2 = 4	Query error
bit1 : 2^1 = 2	Not used
bit0 : 2^0 = 1	Completion of operation

Range 0 to 255

Example of Use

The following example shows how to mask bits 7 to 4 and permit bits 3 to 0. The command data is specified in decimal.

```
*ESE 15
*ESE?
>15
```

*ESR [Standard Event Status Register]

Function

This command queries the standard event status register value.
The standard event status register value is cleared after readout.
This value is the logical product of the 8 bits set by *ESE.

Syntax

```
*ESR?
```

Example of Use

The following example queries the value of the standard event status register. The data is the value when an execution error or command error occurs. There are a total of 48 values (bit 5 = 2^5 = 32 and bit 4 = 2^4 = 16) as shown in Table 2.6.3-1.

```
*ESR?
>48
```

*IDN [Identification]

Function

This command queries product supplier name, model name, serial number, and firmware.

Syntax

```
*IDN?
```

Example of Use

```
*IDN?
>Anritsu,MS9740A,6200123456,1.00.00
```

*OPC [Operation Complete]

Function

If a *OPC command is received, the operation completion bit (bit 0) is set to 1 once all active processes are completed.

If a *OPC? query is received, 1 is returned once all active processes are complete.

The wait for operation completion set by *OPC/*OPC? is disabled after the following events:

- Power ON
- Reception of DCL or SCL on the IEEE488.1 interface
- Reception of the *CLS command
- Reception of the *RST command
- Completion of all active processing

Syntax

```
*OPC
*OPC?
```

Example of Use

```
*OPC?
>1
```

*OPT [Option Identification Query]

Function

This command queries what options are installed.
The response is a numeric from 1 to 64 corresponding to options 1 to 64.
The returned value is 0 when no options are installed.

Option number	Option name
1	GPIB interface
2	Light Source for Wavelength Calibration
3 to 6	Not used
7	OS Upgrade WES7
8 to 64	Not used

Syntax

```
*OPT?
```

Example of Use

```
*OPT?
>1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0
```

*RST [Reset]

Function

This command initializes the setting conditions. However, the following items are not initialized.

- GPIB address
- Output queue
- Service request enable register
- Standard event status enable register

Syntax

```
*RST
```

4 Message Details

*SRE [Service Request Enable]

Function

This command sets the service request enable register.
The setting of 0 to 255 is equivalent to 8-bit binary.
The status byte register mask bit is set to 0.
This command queries the service request enable register value.

Syntax

```
*SRE <numeric_value>
*SRE?

<numeric_value> = bit0 + bit1 + bit2 + bit3 + bit4 + bit5
+ bit6 + bit7
```

bit7 : 2^7 = 128	Not used
bit6 : 2^6 = 64	Always 0
bit5 : 2^5 = 32	Standard event status register
bit4 : 2^4 = 16	MAV
bit3 : 2^3 = 8	Error event register
bit2 : 2^2 = 4	End event register
bit1 : 2^1 = 2	Not used
bit0 : 2^0 = 1	Not used

Range 0 to 255

Example of Use

The following example shows how to mask bits 7, 6, 1, and 0 and permit bits 5 and 2.

```
*SRE 60
*SRE?
>60
```

*STB [Status Byte]

Function

This command queries the status byte register.

Syntax

```
*STB?
```

*TST [Self-Test Query]

Function

This command queries the results of self-diagnosis.

0 Error does not occur after completing test

1 Test cannot be executed. Even though test can be executed, error occurs.

Syntax

```
*TST?
```

Example of Use

```
*TST?
>0
```

*WAI [Wait to Continue]

Function

This command holds execution of the next message until processing of the message sent before `*WAI` is completed.

Syntax

```
*WAI
```

Example of Use

```
SSI;*WAI;DBA?
```

4.4.2 Instrument dependent commands

ACAL [Align with Cal]

Function

This command sets and queries whether performing optical alignment using the optional reference light source.

Syntax

```
ACAL OFF|ON
ACAL?
```

OFF: Disables performing the optical alignment.
ON: Enables performing the optical alignment.

Response Data

```
OFF|ON
```

Example of Use

```
ACAL ON
ACAL?
>ON
```

ALIN [Auto Alignment]

Function

This command executes optical alignment. When alignment is complete, bit 4 of the end event status register (execution complete bit) is set to 1. If a command other than `ALIN 2` is received during optical alignment, this command displays an execution error.

Syntax

```
ALIN 0|1|2
ALIN?
```

0: Restore the data to default value.
1: Execute optical alignment and save the data.
2: Forced shutdown

Response Data

```
0|1|2|3
```

0: Normal end
1: During alignment
2: Aborted optical alignment due to lack of optical level
3: Aborted optical alignment due to other abnormality

Example of Use

```
ALIN 1
ALIN?
>0
```

ANA [Spectrum Analysis]

Function

This command sets the spectrum analysis method and parameters, and then executes analysis.
When the processing is finished, bit 0 (measurement end bit) of the end event status register is set to 1.
The query command reads the method of spectrum analysis function and parameter.
The parameter details using each analysis method are explained individually as follows.

Syntax

```
ANA <switch>[,<parameter>,,,…]ANA?
```

Response Data

```
<switch>,<parameter>,,
```

`<switch>=ENV|NDB|OFF|PWR|RMS|SMSR|THR`

`<parameter>` : The number of `<parameter>` varies depending on the status of `<switch>`.

<parameter> can be omitted. If <parameter> is omitted, this command executes analysis with the current set parameter.

<switch>	Analysis method	Number of <parameter>
ENV	Envelope method	1
NDB	ndB-Loss method	1
PWR	Spectrum analysis for integral power	0
RMS	RMS method	2
SMSR	SMSR method	1
THR	Threshold method	1
OFF	Closes spectrum analysis display	0

ANA ENV [Spectrum Analysis (Envelope)]

Function

This command sets the envelop method and cut level and executes the spectrum analysis.
This command reads the spectrum analysis method and cut level value.

Syntax

```
ANA ENV,<numeric_value>
ANA?
```

Response Data

```
ENV,<numeric_value>
```

`<numeric_value>:` Cut level (dB) 0.1 to 20.0

Example of Use

To set the cut level to 10 dB using the envelop method:

```
ANA ENV,10
ANA?
>ENV,10.0
```

ANA NDB [Spectrum Analysis (NDB)]

Function

This command sets the ndB-Loss method and loss and performs spectrum analysis.
This command queries the loss.

Syntax

```
ANA NDB,<numeric_value>
ANA?
```

Response Data

```
NDB,<numeric_value>
```

`<numeric_value>:` Loss (dB) 0.1 to 50.0

Example of Use

To set the loss to 20 dB using the ndB Loss method:

```
ANA NDB,20
ANA?
>NDB,20.0
```

ANA OFF [Spectrum Analysis OFF]

Function

This command closes the spectrum analysis display.

Syntax

```
ANA OFF
ANA?
```

Response Data

```
OFF
```

Example of Use

```
ANA OFF
ANA?
>OFF
```

ANA PWR [Spectrum Analysis (Spectrum Power)]

Function

This command executes the spectrum analysis of the integral power.
This command reads the spectrum analysis method.

Syntax

```
ANA PWR
ANA?
```

Response Data

```
PWR
```

Example of Use

```
ANA PWR
ANA?
>PWR
```

ANA RMS [Spectrum Analysis (RMS)]

Function

This command sets the RMS method, slice level, and factor K and executes the spectrum analysis method.
This command queries the spectrum analysis method, slice level and factor K.

Syntax

```
ANA RMS,<numeric_value>,<numeric_value>
ANA?
```

Response Data

```
RMS,<numeric_value>,<numeric_value>
```

No.	Parameter type	Range	Details
1	<numeric_value>	0.1 to 50.0	Spectrum level (dB)
2	<numeric_value>	1.00 to 10.00	K: Standard deviation factor

Example of Use

To set the cut level to 20 dB and the factor to 2.35 using the RMS method:

```
ANA RMS,20,2.35
ANA?
>RMS,20.0,2.35
```

ANA SMSR [Spectrum Analysis (SMSR)]

Function

This command sets the SMSR method and detecting method and performs the spectrum analysis.
This command queries the spectrum analysis method and detecting method.

Syntax

```
ANA SMSR,<switch>
ANA?
```

Response Data

```
SMSR,<switch>
```

<switch>: Detecting method { 2NDPEAK|LEFT|RIGHT }

Example of Use

To analyze the left side of the SMSR method:

```
ANA SMSR,LEFT
ANA?
>SMSR,LEFT
```

ANA THR [Spectrum Analysis (THR)]

Function

This command sets the Threshold method and cut level and performs the spectrum analysis.
This command queries the spectrum analysis method and cut level.

Syntax

```
ANA THR,<numeric_value>
ANA?
```

Response Data

```
THR,<numeric_value>
```

<numeric_value>: Cut level (dB) 0.1 to 50.0

Example of Use

To set the cut level to 30 dB using the Threshold method:

```
ANA THR,30
ANA?
>THR,30.0
```

ANAR [Spectrum Analysis Result]

Function

This command queries the spectrum analysis result.

Syntax

```
ANAR?
```

Response Data

```
<numeric_value>,<numeric_value>[,<numeric_value>]
```

The details of spectrum analysis method and numeric values are as follows.

Table 4.4.2-1 Response of ANAR?

Analysis method	Numeric value 1	Numeric value 2	Numeric value 3
Envelope method	Center wavelength (nm|THz)	Spectrum width (nm|THz)	None
ndB Loss method	Center wavelength (nm|THz)	Spectrum width (nm|THz)	Longitudinal mode count
Integral power	Power (dBm)	Center wavelength (nm|THz)	None
RMS method	Center wavelength (nm|THz)	Spectrum width (nm|THz)	Standard deviation σ
SMSR method	Wavelength difference (nm|THz)	Level difference (dB)	None
Threshold method	Center wavelength (nm|THz)	Spectrum width (nm)	None

The center wavelength, spectrum width and wavelength difference are –1 when analysis cannot be performed. The level difference when analysis cannot be performed is –999.99.

Example of Use

Queries analysis results at envelope method

```
ANAR?
>1565.223,1.08
```

Queries analysis results at ndB Loss method

```
ANAR?
>1550.100,12.840,9
```

Queries analysis results at integral power

```
ANAR?
>-15.44,1550.100
```

Queries analysis results at RMS method

```
ANAR?
>1309.330,5.390,2.350
```

Queries SMSR analysis

```
ANAR?
>0.920,38.74
```

Queries SMSR analysis results (when cannot perform analysis)

```
ANAR?
>-1,-999.99
```

Queries analysis results at Threshold method

```
ANAR?
>1298.430,23.52
```


AOFS [Auto Offset]

Function

This command enables/disables the Auto Offset adjustment.
This command queries the On/Off status of the Auto Offset adjustment.

Syntax

```
AOFS OFF|ON
AOFS?
```

ON: Enables the Auto Offset adjustment.
OFF: Disables the Auto Offset adjustment.

Response Data

```
OFF|ON
```

Example of Use

```
AOFS OFF
AOFS?
>OFF
```

AP [Application]

Function

This command sets the type of application function and parameter and executes the analysis.
When the processing is complete, bit 0 (measurement end bit) of the end event status register is set to 1.
Close the display of the application function and read the type of application function and parameter displayed in the screen. The parameter details for each application are described separately below.

Syntax

```
AP <switch>[,<parameter>,…]
AP?
```

Response Data

```
<switch>[,<parameter>,,]
```

`<switch>=AMP|AMP2|DFB|FP|LD|LED|OFF|PMD|WDM|WFIL`

The number of `<parameter>` varies depending on the status of `<switch>`.

The parameter for the application function executes analysis with the current parameter.

<switch>	Application Type
AMP	Optical amplifier
AMP2	Optical amplifier (WDM)
DFB	Distributed feedback laser diode
FP	Fabry-Perot laser diode
LD	Laser diode module
LED	Light-emitting diode
OFF	End of application function
PMD	Polarization mode dispersion
WDM	Wavelength division multiplex transmission
WFIL	WDM Filter

Example of Use

```
AP AMP
AP?
>AMP
AP DFB
AP?
>DFB,2NDPEAK,20.0,6.07
AP PMD
AP?
>PMD 1.00,0.2
```

AP AMP [Application (Optical Amp)]

Function

This command specifies the parameter and analyzes the Optical Amp application.
This command reads the application type and parameter.

Syntax

`AP AMP,<switch>,<parameter>,,`

The number of `<parameter>` varies depending on the status of `<switch>`.

`AP? AMP,<switch>`

Response Data

`AMP[,<switch>,<parameter>,,]`

The number of `<parameter>` varies depending on the status of `<switch>`.

The `<parameter>` details are described below.

<switch>	Processing details
CAL	Resolution Calibration
MSL	Memory Select: Specifies save destination for measuring data.
PASE	Pase: Sets trace for saving ASE spectrum.
PIN	Pin: Sets trace for saving signal optical spectrum.
POUT	Pout: Sets trace for saving output spectrum.
PRM	Parameter: Sets parameters used for optical amplifier measurement.

AP AMP,CAL [Application (Optical AMP Resolution Calibration)]

Function

This command calibrates the resolution of the optical spectrum analyzer for the Optical AMP application.
Bit 4 (execution completion bit) of the end event status register (ESR2) is set to 1 after the completion of resolution calibration.
This command queries the status of the resolution calibration in the Optical AMP application.
This command can be used when in the Optical AMP application mode.

Syntax

```
AP AMP,CAL,{0|1}
AP? AMP,CAL
```

0: Initializes current resolution calibration data
1: Executes resolution calibration

Response Data

```
AMP,CAL,{0|1|2|3}
```

0: Resolution calibration ended normally
1: Resolution calibration suspended due to inadequate optical level
2: Resolution calibration suspended due to other abnormality
3: Resolution calibration ended abnormally

Example of Use

```
AP AMP,CAL,1
AP? AMP,CAL
>AMP,CAL,0
```

AP AMP,MSL [Application (Optical AMP Memory Select)]

Function

This command selects and queries the saving destination of the measurement data at the Optical AMP application.
This message can be used only when the Optical AMP application mode is set.

Note:

PASE can be specified as the measured data save destination of the measured data when an optical amplifier measurement method is polarization nulling (PLZN Nulling). If another measurement method is set, an error is returned when PASE is specified.

Syntax

```
AP AMP,MSL,<switch>
AP? AMP,MSL
```

Response Data

```
AMP,MSL,<switch>
```

```
<switch>: Saving destination of measurement data
{PIN|POUT|PASE}
```

Example of Use

```
AP AMP,MSL,PIN
AP? AMP,MSL
>AMP,MSL,PIN
```

AP AMP,PASE [Application (Optical AMP Pase)]

Function

This command selects and queries the trace memory saving Pase at the Optical AMP application.
This message can be used only when the Optical AMP application mode is set.

Note:

The Pase trace memory can be selected when optical amplifier measurement method is not polarization nulling (PLZN Nulling). However, the Pase trace memory cannot be used when using the measurement method other than PLZN Nulling.

Syntax

```
AP AMP,PASE,<trace>
AP? AMP,PASE
```

Response Data

```
AMP,PASE,<trace>
```

Example of Use

```
AP AMP,PASE,C
AP? AMP,PASE
>AMP,PASE,C
```

AP AMP,PIN [Application (Optical AMP Pin)]

Function

This command selects and queries the trace memory saving Pin at the Optical AMP application.
This message can be used only when the Optical AMP application mode is set.

Syntax

```
AP AMP,PIN,<trace>
AP? AMP,PIN
```

Response Data

```
AMP,PIN,<trace>
```

Example of Use

```
AP AMP,PIN,A
AP? AMP,PIN
>AMP,PIN,A
```

AP AMP,POUT [Application (Optical AMP Pout)]

Function

This command selects and queries the trace memory saving Pout for the Optical AMP application.
This message can be used only when the Optical AMP application mode is set.

Syntax

```
AP AMP,POUT,<trace>
AP? AMP,POUT
```

Response Data

```
AMP,POUT,<trace>
```

Example of Use

```
AP AMP,POUT,B
AP? AMP,POUT
>AMP,POUT,B
```

AP AMP,PRM [Application (Optical AMP Parameter)]

Function

This command sets and queries the measurement parameter at the Optical AMP application.
This message can be used only when the Optical AMP application is set.

Syntax

```
AP AMP,PRM,<switch>,<switch>,<switch>,<numeric_value>,,
AP? AMP,PRM
```

Response Data

```
AMP,PRM,<switch>,<switch>,<switch>,<numeric_value>,,
```

No.	Parameter type	Range	Description
1	<switch>	0|1	0:NF(S-ASE) 1:NF(Total)
2	<switch>	0|1|2|3|4	0: Spect Div Off: Spectrum division off 1: Spect Div On: Spectrum division on 2: PLZN Nulling: Polarization nulling 3: Pulse Method: Pulse method 4: WDM Measure: WDM measurement
3	<switch>	0|1	0: Gauss Fitting ASE Level found by Gauss method 1: Mean Fitting ASE Level found by averaging value
4	<numeric_value>	0.10 to 100.00	Fitting Span (nm) Wavelength range for calculating ASE level
5	<numeric_value>	0.10 to 100.00	Masked Span (nm) Wavelength range excluded from ASE level calculation Set a small value than Fitting Span.
6	<numeric_value>	–10.00to 10.00	Pin Loss (dB) Optical signal level loss correction coefficient
7	<numeric_value>	–10.00to 10.00	Pout Loss (dB) Optical signal level loss correction coefficient
8	<numeric_value>	0.100 to 10.000	NF Calibration (dB) Noise figure calibration coefficient
9	<numeric_value>	0.00 to 30.00	O.BPF Level Calibration (dB) Optical filter loss correction coefficient
10	<numeric_value>	0.01 to 999.99	O.BPF Band Width (nm) Optical filter passband width
11	<numeric_value>	–10.00to 10.00	Pol Loss (dB) Polarization controller loss correction coefficient

Note:

Parameters 5th to 11th are common parameters at optical amplifier measurement depending on the second <switch> (measurement method) setting.

Depending on the measurement method, the 5th to 11th <numeric_value> is an unnecessary parameter but it cannot be omitted. In this case, set any in-range value at the 5th to 11th <numeric_value>.

Example of Use

```
AP AMP,PRM,0,2,0,20,2,0,0,1,0,30,0
AP? AMP,PRM
>AMP,PRM,0,2,0,20,2,0,0,1,0,30,0
```

AP AMP2 [Application (Optical Amp Multi Channel)]

Function

This command specifies the parameters and executes the Optical AMP (WDM) application analysis.
This command reads the parameters for the Optical AMP (WDM) application.

Syntax

`AP AMP2,<switch>,<parameter>,,`

The number of `<parameter>` elements differs with the `<switch>`.

`AP? AMP2`

Response Data

`AMP2`

<switch>	Processing details
ASE	Sets the ASE Parameter.
MSL	Memory Select: Specifies the save destination for the measured data.
OBPF	Sets the optical band pass filter settings.
PIN	Pin: Sets the trace that saves the signal spectrum.
POUT	Pout: Sets the trace that saves the output spectrum.
PRM	Parameter: Sets the parameters used with the Optical AMP (WDM) application.
SLV	Sets the slice level.
STHR	Sets the threshold value for detecting the peak (channel).
WL	Sets the wavelength detection method.

Examples of Use:

```
AP AMP2
AP?
>AMP2
```

AP AMP2,ASE [Application (Optical AMP Multi Channel ASE Detection Type)]

Function

This command sets the ASE parameters for the Optical AMP (WDM) application.
Settings and queries for each parameter are explained separately later.
This command queries the ASE Interpolation Detection Type for the Optical AMP (WDM) application.

Syntax

```
AP AMP2,ASE,<switch>[,<parameter>]
AP? AMP2,ASE
```

Response Data

```
AMP2,ASE,{AREA|POINT}
```

AREA:	The Detection Type is set to Area.
POINT:	The Detection Type is set to Point.

<switch>	Process	Number of <parameter>
AREA	Sets Detection Type to Area	0
	Sets/queries Fitting Span and Masked Span	1
AREA,FUNC	Sets/queries Fitting Curve	1
POINT	Sets Detection Type to Point	0
	Sets/queries Noise Position	1

Examples of Use:

```
AP AMP2,ASE,AREA
AP? AMP2,ASE
>AMP2,ASE,AREA
```

AP AMP2,ASE,AREA [Application (Optical AMP Multi Channel ASE Area Parameter)]

Function

This command sets the ASE Area Parameter for the Optical AMP (WDM) application.
This command queries the ASE Area Parameter for the Optical AMP (WDM) application.

Syntax

```
AP AMP2,ASE,AREA,<CENTER|numeric_value>,<numeric_value>
AP? AMP2,ASE,AREA
```

Response Data

```
AMP2,ASE,AREA,<CENTER|numeric_value>,<numeric_value>
```

No.	Parameter type	Range	Description
1	CENTER	–	Sets the halfway point between channels as the interpolation range.
	<numeric_value>	0.10 to 100.00	Fitting Span (nm)
2	<numeric_value>	0.10 to 100.00	Masked Span (nm)

Examples of Use:

```
AP AMP2,ASE,AREA,10.00,8.00
AP? AMP2,ASE,AREA
>AMP2,ASE,AREA,10.00,8.00
```

AP AMP2,ASE,AREA,FUNC [Application (Optical AMP Multi Channel ASE Fitting Curve)]

Function

This command sets the Fitting Curve for the Optical AMP (WDM) application.
This command queries the Fitting Curve setting for the Optical AMP (WDM) application.

Syntax

```
AP AMP2,ASE,AREA,FUNC,<switch>
AP? AMP2,ASE,AREA,FUNC
```

Response Data

```
AMP2,ASE,AREA,FUNC,<switch>
```

<switch> = 3RD | 4TH | 5TH | GAUSS | LINEAR

3 RD:	3rdPOLY
4 TH:	4thPOLY
5TH:	5thPOLY
GAUSS:	GAUSS
LINEAR:	LINEAR

Examples of Use:

```
AP AMP2,ASE,AREA,FUNC,GAUSS
AP? AMP2,ASE,AREA,FUNC
>AMP2,ASE,AREA,FUNC,GAUSS
```

AP AMP2,ASE,POINT [Application (Optical AMP Multi Channel ASE Point)]

Function

This command sets the Noise Position for the Optical AMP (WDM) application.
This command queries the Noise Position for the Optical AMP (WDM) application.

Syntax

```
AP AMP2,ASE,POINT,<switch>|<numeric_value>
AP? AMP2,ASE,POINT
```

Response Data

```
AMP2,ASE,POINT <switch>|<numeric_value>
```

<switch> = CENTER|RES
CENTER: Sets the center point between peaks as the Noise Position.
RES: Sets a value dependent on Resolution when the waveform is measured as the Noise Position.

<numeric_value>: Uses the set value as the Noise Position.
0.01 to 100.00 (nm)

Examples of Use:

```
AP AMP2,ASE,POINT,CENTER
AP? AMP2,ASE,POINT
>AMP2,ASE,POINT,CENTER
```

AP AMP2,MSL [Application (Optical AMP Multi Channel Memory Select)]

Function

This command selects the saving destination for measurement data from the Optical AMP (WDM) application.
This command queries the saving destination for measurement data from the Optical AMP (WDM) application.
This message can be used when in Optical AMP (WDM) application mode.

Syntax

```
AP AMP2,MSL,<switch>
AP? AMP2,MSL
```

Response Data

```
AMP2,MSL,<switch>
```

`<switch>`: Measurement data saving destination `{PIN|POUT}`

Examples of Use:

```
AP AMP2,MSL,PIN
AP? AMP2,MSL
>AMP2,MSL,PIN
```

AP AMP2,OBPF [Application (Optical AMP Multi Channel Opt. Band Pass Filter)]

Function

This command sets the O.BPF Lvl Cal/BW for the Optical AMP (WDM) application.
This command queries the O.BPF Lvl Cal/BW setting for the Optical AMP (WDM) application.

Syntax

```
AP AMP2,OBPF,<numeric_value>,<numeric_value>
AP? AMP2,OBPF
```

Response Data

```
AMP2,OBPF,<numeric_value>,<numeric_value>
```

No.	Parameter type	Range	Description
1	<numeric_value>	0.00 to 30.00	O.BPF Level Calibration (dB) Optical filter loss correction coefficient
2	<numeric_value>	0.00 to 999.99	O.BPF Band Width (nm) Optical filter pass band width

Examples of Use:

```
AP AMP2,OBPF,0,0
AP? AMP2,OBPF
>AMP2,OBPF,0.00,0.00
```

AP AMP2,PIN [Application (Optical AMP Multi Channel Pin)]

Function

This command selects the trace memory for saving the Pin of the Optical AMP (WDM) application.
This command queries the trace memory for saving the Pin of the Optical AMP (WDM) application.
This message can be used when in Optical AMP (WDM) application mode.

Syntax

```
AP AMP2,PIN,<trace>
AP? AMP2,PIN
```

Response Data

```
AMP2,PIN,<trace>
```

Examples of Use:

```
AP AMP2,PIN,A
AP? AMP2,PIN
>AMP2,PIN,A
```

AP AMP2,POUT [Application (Optical AMP Multi Channel Pout)]

Function

This command selects the trace memory that saves Pout for the Optical AMP (WDM) application.
This command queries the trace memory that saves Pout for the Optical AMP (WDM) application.
This message can be used when in Optical AMP (WDM) application mode.

Syntax

```
AP AMP2,POUT,<trace>
AP? AMP2,POUT
```

Response Data

```
AMP2,POUT,<trace>
```

Examples of Use:

```
AP AMP2,POUT,B
AP? AMP2,POUT
>AMP2,POUT,B
```

AP AMP2,PRM [Application (Optical AMP Multi Channel Parameter)]

Function

This command sets the measurement parameters for the Optical AMP (WDM) application.
This command queries the measurement parameters for the Optical AMP (WDM) application.
This message can be used when in Optical AMP (WDM) application mode.

Syntax

```
AP
AMP2,PRM,<switch>,<switch>,<numeric_value>,<numeric_valu
e>,<numeric_value>,<switch>,<switch>
AP? AMP2,PRM
```

Response Data

```
AMP2,PRM,<switch>,<switch>,<numeric_value>,<numeric_valu
e>,<numeric_value>,<switch>,<switch>
```

No.	Parameter type	Range	Description
1	<switch>	0|1	0:NF (S-ASE) 1:NF (Total)
2	<switch>	0|1|2	0: ISS Method (IEC) 1: ISS Method (Advanced) 2: Off
3	<numeric_value>	–10.00 to 10.00	Pin Loss(Offset) (dB) Loss correction factor for signal level
4	<numeric_value>	–10.00 to 10.00	Pout Loss(Offset) (dB) Loss correction factor for optical level output
5	<numeric_value>	0.100 to 10.000	NF Calibration (dB) Correction factor for noise figure
6	<switch>	0|1	0: Actual Resolution (Measured) 1: Actual Resolution (Initial)
7	<switch>	OFF|ON	OFF: Fitting curve not displayed ON: Fitting curve displayed

Examples of Use:

```
AP AMP2,PRM,0,2,10,5,10,0,ON
AP? AMP2,PRM
>AMP2,PRM,0,2,10,5,10,0,ON
```

AP AMP2,SLV [Application (Optical AMP Multi Channel Slice Level)]

Function

This command sets the slice level for the Optical AMP (WDM) application.
This command queries the slice level for the Optical AMP (WDM) application.

Syntax

```
AP AMP2,SLV,<numeric_value>
AP? AMP2,SLV
```

Response Data

```
AMP2,SLV,<numeric_value>
```

`<numeric_value>:` Slice level (dB) 0.1 to 50.0

Examples of Use:

```
AP AMP2,SLV,0.1
AP? AMP2,SLV
>AMP2,SLV,0.1
```

AP AMP2,STHR [Application (Optical AMP Multi Channel Search Threshold)]

Function

This command sets the threshold value for detecting the peak (channel) in the Optical AMP (WDM) application.
This command reads the threshold value for detecting the peak (channel) in the Optical AMP (WDM) application.

Syntax

```
AP AMP2,STHR,<numeric_value>
AP? AMP2,STHR
```

Response Data

```
AMP2,STHR,<numeric_value>
```

`<numeric_value>:` Peak (channel) detection threshold value 0.01 to 10.00 (dB)

Examples of Use:

```
AP AMP2,STHR,0.5
AP? AMP2,STHR
>AMP2,STHR,0.5
```

AP AMP2,WL [Application (Optical AMP Multi Channel Wavelength Detection Type)]

Function

This command sets the wavelength detection method for the Optical AMP (WDM) application.
This command queries the wavelength detection method for the Optical AMP (WDM) application.

Syntax

```
AP AMP2,WL,PEAK|THRESHOLD[,<numeric_value>]
AP? AMP2,WL
```

Response Data

```
AMP2,WL,PEAK|THRESHOLD,<numeric_value>
```

No. 1 parameter Detection Type setting
PEAK
THRESHOLD
No. 2 parameter Threshold Cut Level (dB)
<numeric_value>: 0.1 to 50.0
If No. 2 parameter is omitted, the Threshold Cut Level is not changed.

Examples of Use:

```
AP AMP2,WL,THRESHOLD,25
AP? AMP2,WL
>AMP2,WL,THRESHOLD,25
```

AP DFB [Application (DFB-LD)]

Function

This command sets the parameters and performs DFB-LD application analysis.
This command queries the parameters for the DFB-LD application.

Syntax

```
AP DFB,<switch>,<numeric_value>,<numeric_value>
AP? DFB
```

Response Data

```
DFB,<switch>,<numeric_value>,<numeric_value>
```

The parameters are as follows.

No.	Type	Range	Description
1	<switch>	2NDPEAK|LEFT|RIGHT	Detecting method of SMSR analysis rates
2	<numeric_value>	0.1 to 50.0	Slice level (dB)
3	<numeric_value>	1.00 to 10.00	k: Standard deviation factor

Example of Use

```
AP DFB,2NDPEAK,25.0,6.07
AP? DFB
>DFB,2NDPEAK,25.0,6.07
```

AP DFB,NDW [Application (DFB-LD ndB Width)]

Function

This command sets the ndB Width parameter for the DFB-LD application.
This command queries the ndB Width parameter for the DFB-LD application.
If application other than DFB-LD is selected, it switches to DFB-LD application display.

About n value:
"n" indicates the spectrum width at the designated cute level, which inputs/outputs down to 1 decimal point.
Data range:
0.1≤d≤50.0

Syntax

```
AP DFB,NDW,n
AP? DFB,NDW
>DFB,NDW,n
```

Example of Use

```
AP DFB,NDW,20.0
AP? DFB,NDW
>20.0
```

AP DFB,SRES [Application (DFB-LD Search Resolution)]

Function

This command sets and reads the level resolution to detect the side mode in DFB-LD application.

Syntax

```
AP DFB,SRES,<numeric_value>
AP? DFB,SRES
```

Response Data

```
DFB,SRES,<numeric_value>
```

The parameters are as follows:

`<numeric_value>:` Level resolution 0.10 to 10.00 (dB)

Example of Use

```
AP DFB,SRES,2.0
AP? DFB,SRES
>DFB,SRES,2.0
```

AP FP [Application (FP-LD)]

Function

This command sets the parameter and performs FP-LD application analysis.
This command queries the parameter.

Syntax

```
AP FP[,<numeric_value>]
AP?
```

Response Data

```
FP,<numeric_value>
```

`<numeric_value>:` Cut Level (dB) 0.1 to 50.0

Example of Use

```
AP FP,30
AP?
>FP,30.0
```

AP LD [Application (LD Module)]

Function

This command specifies the parameter and analyzes the LD Module application.
This command reads the application type and parameter.

Syntax

AP LD,<switch>,<parameter>,,

The number of <parameter> varies depending on <switch>.

AP? LD,<switch>

Response Data

LD,<switch>,<parameter>,,

The number of <parameter> varies depending on <switch>.

The <parameter> details are described below.

<switch>	Processing details
K	Sets magnification for standard deviation at spectrum width measurement using RMS method
NNRMZ	Sets Noise Level normalization display
NOISE	Sets Noise Parameter
NP	Sets Noise Position (nm)
NT	Sets Noise Type
SIGNAL	Sets Signal Parameter
SMSR	SMSR Parameter: Sets detection method of side mode suppression ratio
SRES	Sets level resolution to detect side mode
THR	Slice level (dB): 0.1 to 50.0

Example of Use

AP LD,THR,20

AP? LD,THR

>LD,THR,20

AP LD,K [Application (LD Module K)]

Function

This command sets and reads the magnification for standard deviation in the LD Module application.

Syntax

```
AP LD,K,<numeric_value>
AP? LD,K
```

Response Data

```
LD,K,<numeric_value>
```

<numeric_value>: k Standard deviation multiplier 1.00 to 10.00

Example of Use

```
AP LD,K,1.00
AP? LD,K
>LD,K,1.00
```

AP LD,NDW [Application (LD Module ndB Width)]

Function

This command sets and queries the ndB Width parameter for the LD Module application.
If application other than LD Module is selected, it switches to LD Module application display.

About n value:
"n" indicates the spectrum width at the designated cute level, which inputs/outputs down to 1 decimal point.
Data range:
0.1≤d≤50.0

Syntax

```
AP LD,NDW,n
AP? LD,NDW
>DFB,LD,n
```

Example of Use

```
AP LD,NDW,20.0
AP? LD,NDW
>20.0
```

AP LD,NNRMZ [Application (LD Module Noise Normalization)]

Function

This command sets and queries the Noise BW of Noise Parameter for LD Module application.

Syntax

```
AP LD,NNRMZ,<numeric_value>
AP? LD,NNRMZ
```

Response Data

```
LD,NNRMZ,<numeric_value>
```

`<numeric_value>:` Noise BW setting value 0.1 to 1.0 (nm)

Example of Use

```
AP LD,NNRMZ,0.3
AP? LD,NNRMZ
>LD,NNRMZ,0.3
```

AP LD,NOISE [Application (LD Module Noise Detection Type)]

Function

This command sets the Noise measurement parameter for LD Module application.
For how to set and query each parameter, refer to the latter pages described in details.
This command queries the Detection Type of the Noise parameter for LD Module application.

Syntax

```
AP LD,NOISE,<switch>[,<parameter>]
AP? LD,NOISE
```

Response Data

```
LD,NOISE,{AREA|NOISE}
```

AREA:	Sets Detection Type to Area
POINT:	Sets Detection Type to Point

<switch>	Procedures	Number of <parameter>
AREA	Sets Detection Type to Area	0
	Sets/queries Area Type to Channel or User Specify	1
AREA,CH	Sets/queries Fitting Span and Masked Span	2
AREA,FUNC	Sets/queries Fitting Curve	2
AREA,USER	Sets/queries Noise Position and Span	4
POINT	Sets Detection Type to Point	0
	Sets/queries detection position and wavelength difference	2

Example of Use

```
AP LD,NOISE,AREA
AP? LD,NOISE
>LD,NOISE,AREA
```

AP LD,NOISE,AREA [Application (LD Module Noise Area Parameter)]

Function

This command sets the Noise Parameter for LD Module application to Channel or User Specify.
When the parameter is omitted, the Detection Type in Noise Parameter is set to Area.
This command queries the Noise Parameter Area Type for LD Module application.

Syntax

```
AP LD,NOISE,AREA,<switch>
AP? LD,NOISE,AREA
```

Response Data

```
LD,NOISE,AREA,<switch>
```

`<switch>:` `CH|USER`

CH: Sets Area Type to Channel
USER: Sets Area Type to User Specify

Example of Use

```
AP LD,NOISE,AREA,CH
AP? LD,NOISE,AREA
>LD,NOISE,AREA,CH
```

AP LD,NOISE,AREA,CH [Application (LD Module Noise Channel Area Parameter)]

Function

This command sets and queries the Channel Area in Noise Parameter for LD Module application.

Syntax

```
AP LD,NOISE,AREA,CH,<numeric_value>,<numeric_value>
AP? LD,NOISE,AREA,CH
```

Response Data

```
LD,NOISE,AREA,CH,<numeric>,<numeric>
```

No.	Type	Range	Description
1	<numeric_value>	0.01 to 20.00	Fitting Span (nm)
2	<numeric_value>	0.01 to 20.00	Masked Span (nm)

Example of Use

```
AP LD,NOISE,AREA,CH,10.00,8.00
AP? LD,NOISE,AREA,CH
>LD,NOISE,AREA,CH,10.00,8.00
```

AP LD,NOISE,AREA,FUNC [Application (LD Module Noise Fitting Curve)]

Function

This command sets and queries the Fitting Curve in Noise Parameter for LD Module application.

Syntax

```
AP LD,NOISE,AREA,FUNC,<switch>,OFF|ON
AP? LD,NOISE,AREA,FUNC
```

Response Data

```
LD,NOISE,AREA,FUNC,<switch>,OFF|ON
```

<switch>=3 RD | 4 TH | 5TH | GAUSS | LINEAR

Parameter 1:	Fitting Curve Type
3 RD:	3rdPOLY
4 TH:	4thPOLY
5 TH:	5thPOLY
GAUSS:	GAUSS
LINEAR:	LINEAR
Parameter 2:	Fitting Curve Display
OFF:	Does not display fitting curve
ON:	Displays fitting curve

Example of Use

```
AP LD,NOISE,AREA,FUNC,GAUSS,ON
AP? LD,NOISE,AREA,FUNC
>LD,NOISE,AREA,FUNC,GAUSS,ON
```

AP LD,NOISE,AREA,USER [Application (LD Module Noise User Specify Area Parameter)]

Function

This command sets and queries the User Specify Area in Noise Parameter for LD Module application.

Syntax

```
AP LD,NOISE,AREA,USER,<numeric_value>,<numeric_value>,
   <numeric_value>,<numeric_value>
AP? LD,NOISE,AREA,USER
```

Response Data

```
LD,NOISE,AREA,USER,<numeric_value>,<numeric_value>,
<numeric_value>,<numeric_value>
```

No.	Type	Range	Description
1	<numeric_value>	0.01 to 100.00	Left Noise Position (nm)
2	<numeric_value>	0.01 to 100.00	Left Span (nm)
3	<numeric_value>	0.01 to 100.00	Right Noise Position (nm)
4	<numeric_value>	0.01 to 100.00	Right Span (nm)

Example of Use

```
AP LD,NOISE,AREA,USER,50.00,10.00,60.00,15.00
AP? LD,NOISE,AREA,USER
>LD,NOISE,AREA,USER,50.00,10.00,60.00,15.00
```

AP LD,NOISE,POINT [Application (LD Module Noise Point)]

Function

This command sets and queries Point and Noise Position in Noise Parameter for LD Module application.
When the parameter is omitted, the Detection Type in Noise Parameter is set to Point.

Syntax

```
AP LD,NOISE,POINT <switch>,<numeric_value>
AP? LD,NOISE,POINT
```

Response Data

```
LD, NOISE,POINT <switch>,{<numeric_value>|OFF}
```

<switch>: AVERAGE|HIGHER|LEFT|RIGHT

<numeric_value>:
Sets noise level for the Wavelength difference between 0.01 and 20.0 (nm)

OFF: Level dip regarded as noise level

Example of Use

```
AP LD,NOISE,POINT,AVERAGE
AP? LD,NOISE,POINT
>LD,NOISE,POINT,AVERAGE
```

AP LD,NP [Application (LD Module Noise Position)]

Function

This command sets Noise Position for the LD Module application.
This command reads the settings of Noise Position for the LD Module application.

Syntax

```
AP LD,NP,{<numeric_value>|OFF}
AP? LD,NP
```

Response Data

```
LD,NP,{<numeric_value>|OFF}
```

`<numeric_value>`: Noise Position (nm) 0.01 to 20.00
`OFF`: Auto-detects Noise Position

Example of Use

```
AP LD,NP,OFF
AP? LD,NP
>LD,NP,OFF
```

AP LD,NT [Application (LD Module Noise Type)]

Function

The command sets the Detection Type in Noise Parameter for LD Module application to Point and sets the measurement method. This command reads the Point for LD Module application.

This command has the following restrictions. We recommend using AP LD,NOISE,POINT as a substitute for this command.
The settings for Signal Parameter is changed as follows:

- Wavelength Detection Type: Peak
- Level Detection Type: Point

The settings for Noise Parameter is changed as follows:

- Detection Type: Point
- Noise BW: 1.0

Syntax

```
AP LD,NT,<switch>
AP? LD,NT
```

Response Data

```
LD,NP,<switch>
```

<switch>: Noise measurement method
{HIGHER|LEFT|RIGHT|AVERAGE}

Example of Use

```
AP LD,NT,LEFT
AP? LD,NT
>LD,NT,LEFT
```

AP LD,SIGNAL,LV [Application (LD Module Signal Level)]

Function

This command sets and queries the level detection method in Signal Parameter for LD Module application.

Syntax

```
AP LD,SIGNAL,LV,{INTG[,<numeric_value>]|POINT}
AP? LD,SIGNAL,LV
```

Response Data

```
LD,SIGNAL,LV,INTG|POINT,<numeric_value>
```

Parameter 1: Sets Detection Type
INTG: ΣPower
POINT: Point

Parameter 2: Signal Span(nm)
<numeric_value>:0.01 to 50.00
When the second parameter is omitted, Signal Span is not changed.

Example of Use

```
AP LD,SIGNAL,LV,INTG,0.50
AP? LD,SIGNAL,LV
>LD,SIGNAL,LV,INTG,0.50
```

AP LD,SIGNAL,SL [Application (LD Module Signal Level)]

Function

This command sets and queries the signal level in Signal Parameter for LD Module application.

Syntax

```
AP LD,SIGNAL,SL,{SIGNOI}|SIG}
AP? LD,SIGNAL,SL
```

Response Data

```
LD,SIGNAL,SL,SIGNOI|SIG
```

Signal Level

SIGNOI:	Signal - Noise
SIG:	Signal

Example of Use

```
AP LD,SIGNAL,SL,SIG
AP? LD,SIGNAL,SL
>LD,SIGNAL,SL,SIG
```

AP LD,SIGNAL,WL [Application (LD Module Signal Wavelength)]

Function

This command sets and queries the wavelength detection method in Signal Parameter for LD Module application.

Syntax

```
AP LD,SIGNAL,WL,{PEAK|THRESHOLD[,<numeric_value>]}
AP? LD,SIGNAL,WL
```

Response Data

```
LD,SIGNAL,LV,PEAK|THRESHOLD,<numeric_value>
```

Parameter 1: Sets Detection Type
PEAK
THRESHOLD

Parameter 2: Threshold Cut Level(dB)
<numeric_value>: 0.1 to 50.0
When the second parameter is omitted, Threshold Cut Level is not changed.

Example of Use

```
AP LD,SIGNAL,WL,THRESHOLD,25
AP? LD,SIGNAL,WL
>LD,SIGNAL,WL,THRESHOLD,25
```

AP LD,SMSR [Application (LD Module SMSR Parameter)]

Function

This command sets and reads the detection method of the side mode suppression ratio for LD module application.

Syntax

```
AP LD,SMSR,<switch>
AP? LD,SMSR
```

Response Data

```
LD,SMSR,<switch>
```

<switch>: Detection method of side mode oppression rate
{2NDPEAK|LEFT|RIGHT}

Example of Use

```
AP LD,SMSR,LEFT
AP? LD,SMSR
>LD,SMSR,LEFT
```

AP LD,SRES [Application (LD Module Search Resolution)]

Function

This command sets and reads the level resolution to detect the side mode for LD module application.

Syntax

```
AP LD,SRES,<numeric_value>
AP? LD,SRES
```

Response Data

```
LD,SRES,<numeric_value>
```

<numeric_value>: Level resolution 0.10 to 10.00 (dB)

Example of Use

```
AP LD,SRES,0.5
AP? LD,SRES
>LD,SRES,0.5
```

AP LD,THR [Application (LD Module Slice Level)]

Function

This command sets the slice level in Signal Parameter in the LD Module application.
This command reads the slice level in Signal Parameter in the LD Module application.

Syntax

```
AP LD,THR,<numeric_value>
AP? LD,THR
```

Response Data

```
LD,THR,<numeric_value>
```

`<numeric_value>:` Slice level (dB) 0.1 to 50.0

Example of Use

```
AP LD,THR,3.0
AP? LD,THR
>LD,THR,3.0
```

AP LED [Application (LED)]

Function

This command executes the LED application and specifies the parameters.
This command queries the parameters for the LED application.

Syntax

```
AP LED,<numeric_value>,<numeric_value>,<numeric_value>
AP? LED
```

Response Data

```
LED,<numeric_value>,<numeric_value>,<numeric_value>
```

No.	Type	Range	Description
1	<numeric_value>	0.1 to 50.0	Cut Level (dB)
2	<numeric_value>	–10.00 to 10.00	Total power correction value (dB)
3	<numeric_value>	1.00 to 10.00	K: Standard deviation factor

Example of Use

```
AP LED,35,0,2.35
AP? LED
>LED,35.0,0.00,2.35
```

AP OFF [Application OFF]

Function

This command closes display of the application function.

Syntax

```
AP OFF
```

Example of Use

```
AP OFF
AP?
>OFF
```

AP PMD [Application (PMD)]

Function

This command sets the parameters and performs the PMD application.
This command queries the parameters for the PMD application.
When the second parameter measurement method is set to Manual, the 1stPeak Marker and LastPeak Marker remote operations use the MKA and MKB command, respectively.

Syntax

```
AP PMD,<numeric_value>,<switch>,[<numeric_value>]
AP? PMD
```

Response Data

```
AP PMD,<numeric_value>,<switch>,[<numeric_value>]
```

No.	Type	Range	Description
1	<numeric_value>	0.01 to 1.00	Mode Coupling factor (dB)
2	<switch>	0|1	Selecting measurement method 0: Auto 1: Manual
3	<numeric_value>	2 to 99	Peak Count Measurement method 0: can be omitted when Auto is set.

Example of Use

```
AP PMD,0.8,1,8
AP? PMD
>PMD,0.8,1,8
```

AP WDM [Application (WDM)]

Function

This command specifies the parameter and analyzes the WDM application.
This command reads the display method for the WDM application.

Syntax

```
AP WDM,<switch>,<parameter>,,
```

The number of <parameter> varies depending on the status of <switch>.

```
AP? WDM
```

Response Data

```
WDM,{MPK|REL|SNR|TBL}
```

<switch>	Processing details
MPK	Multi Peak: Sets Multi Peak display
REL	Relative: Displays relative value
SNR	SNR: Displays signal vs. noise
TBL	Table: Displays list
PKT	Selects signal wavelength detection method.
SIGNAL	Sets Signal Parameter
SLV	Sets slice level
TCL	Sets cut level at signal wavelength calculation using Threshold analysis
NNRMZ	Sets Noise Level normalization display
NOISE	Sets Noise Parameter

Example of Use

```
AP WDM
AP?
>WDM
```

AP WDM,MPK [Application (WDM MultiPeak)]

Function

This command changes display to MultiPeak for the WDM application.
This command reads the screen display type for the WDM application.

Syntax

```
AP WDM,MPK
AP? WDM,MPK
```

Response Data

```
WDM,MPK
```

Example of Use

```
AP WDM,MPK
AP? WDM,MPK
>WDM,MPK
```

AP WDM,NNRMZ [Application (WDM Noise Normalization)]

Function

This command sets and queries the Normalization and Noise BW for WDM application.

Syntax

```
AP WDM,NNRMZ,{OFF|ON}[,<numeric_value>]
AP? WDM,NNRMZ
```

Response Data

```
WDM,NNRMZ,OFF|ON,<numeric_value>
```

OFF|ON: Normalization setting
<numeric_value>: Noise BW setting value 0.1 to 1.0 (nm)

Example of Use

```
AP WDM,NNRMZ,ON,0.5
AP? WDM,NNRMZ
>WDM,NNRMZ,ON,0.5
AP WDM,NNRMZ,OFF
AP? WDM,NNRMZ
>WDM,NNRMZ,OFF,0.5
```

AP WDM,NOISE [Application (WDM Noise Detection Type)]

Function

This command sets the Noise Parameter for WDM application.
For how to set and query each parameter, refer to the latter pages described in details.
This command queries the Noise Parameter Detection Type for WDM application.

Syntax

```
AP WDM,NOISE,<switch>
AP? WDM,NOISE
```

Response Data

```
WDM,NOISE,AREA|POINT
```

AREA: Sets Detection Type to Area
POINT: Sets Detection Type to Point

<switch>	Procedures	Number of <parameter>
AREA	Sets Detection Type to Area	0
	Sets/queries Area Type to Channel or User Specify	1
AREA,CH	Sets/queries Fitting Span and Masked Span	2
AREA,FUNC	Sets/queries Fitting Curve	2
AREA,USER	Sets/queries Noise Position and Span	4
POINT	Sets Detection Type to Point	0
	Sets/queries detection position and wavelength difference	2

Example of Use

```
AP WDM,NOISE,AREA
AP? WDM,NOISE
>WDM,NOISE,AREA
```

AP WDM,NOISE,AREA [Application (WDM Noise Area Parameter)]

Function

This command sets the Area Type in Noise Parameter for WDM application to Channel or User Specify and queries the Area Type. When the parameter is omitted, the Noise Parameter Detection Type is set to Area.

Syntax

```
AP WDM,NOISE,AREA,<switch>
AP? WDM,NOISE,AREA
```

Response Data

```
WDM,NOISE,AREA,<switch>

<switch>: CH|USER
```

CH: Sets Area Type to Channel
USER: Sets Area Type to User Specify

Example of Use

```
AP WDM,NOISE,AREA,CH
AP? WDM,NOISE,AREA
>WDM,NOISE,AREA,CH
```

AP WDM,NOISE,AREA,CH [Application (WDM Noise Channel Area Parameter)]

Function

This command sets and queries the Channel Area in Noise Parameter for WDM application.

Syntax

```
AP WDM,NOISE,AREA,CH,<numeric_value>,<numeric_value>
AP? WDM,NOISE,AREA,CH
```

Response Data

```
WDM,NOISE,AREA,CH,<numeric>,<numeric>
```

No.	Type	Range	Description
1	<numeric_value>	0.01 to 20.00	Fitting Span (nm)
2	<numeric_value>	0.01 to 20.00	Masked Span (nm)

Example of Use

```
AP WDM,NOISE,AREA,CH,10.00,8.00
AP? WDM,NOISE,AREA,CH
>WDM,NOISE,AREA,CH,10.00,8.00
```

AP WDM,NOISE,AREA,FUNC [Application (WDM Noise Fitting Curve)]

Function

This command sets and queries the Fitting Curve in Noise Parameter for WDM application.

Syntax

```
AP WDM,NOISE,AREA,FUNC,<switch>,OFF|ON
AP? WDM,NOISE,AREA,FUNC
```

Response Data

```
WDM,NOISE,AREA,FUNC,<switch>,OFF|ON
```

<switch>=3RD | 4TH | 5TH | GAUSS | LINEAR

Parameter 1:	Fitting curve type
3RD:	3rdPOLY
4TH:	4thPOLY
5TH:	5thPOLY
GAUSS:	GAUSS
LINEAR:	LINEAR

Parameter 2:	Fitting curve display
OFF:	Does not display fitting curve
ON:	Displays fitting curve

Example of Use

```
AP WDM,NOISE,AREA,FUNC,GAUSS,ON
AP? WDM,NOISE,AREA,FUNC
>WDM,NOISE,AREA,FUNC,GAUSS,ON
```

AP WDM,NOISE,AREA,USER [Application (WDM Noise User Specify Area Parameter)]

Function

This command sets and queries the User Specify Area in Noise Parameter for WDM application.

Syntax

```
AP WDM,NOISE,AREA,USER,<numeric_value>,<numeric_value>,
   <numeric_value>,<numeric_value>
AP? WDM,NOISE,AREA,USER
```

Response Data

```
WDM,NOISE,AREA,USER,<numeric_value>,<numeric_value>,
<numeric_value>,<numeric_value>
```

No.	Type	Range	Description
1	<numeric_value>	0.01 to 100.00	Left Noise Position (nm)
2	<numeric_value>	0.01 to 100.00	Left Span (nm)
3	<numeric_value>	0.01 to 100.00	Right Noise Position (nm)
4	<numeric_value>	0.01 to 100.00	Right Span (nm)

Example of Use

```
AP WDM,NOISE,AREA,USER,50.00,10.00,60.00,15.00
AP? WDM,NOISE,AREA,USER
>WDM,NOISE,AREA,USER,50.00,10.00,60.00,15.00
```

AP WDM,NOISE,POINT [Application (WDM Noise Point)]

Function

This command sets and queries the Noise Position and Point in Noise Parameter for WDM application.
When the parameter is omitted, the Detection Type in Noise Parameter is set to Point.

Syntax

```
AP WDM,NOISE,POINT[,<switch>,{<numeric_value>|OFF}]
AP? WDM,NOISE,POINT
```

Response Data

```
WDM, NOISE,POINT,<switch>,{<numeric_value>|OFF}
```

<switch>:	ARVERAGE|HIGHER|LEFT|RIGHT
<numeric_value>:	Sets noise level for the Wavelength difference between 0.01 and 20.0 (nm)

OFF: Level dip regarded as noise level

Example of Use

```
AP WDM,NOISE,POINT,AVERAGE,OFF
AP? WDM,NOISE,POINT
>WDM,NOISE,POINT,AVERAGE,OFF
```

AP WDM,PKT [Application (WDM PeakType)]

Function

This command sets and queries the signal wavelength detection method at WDM application.
Setting is the same as AP WDM,SIGNAL,WL.

This command has the following restrictions. We recommend using AP WDM,SIGNAL,WL as a substitute for this command.
The settings for Signal Parameter are changed as follows:

- Level Detection Type:Point

Syntax

```
AP WDM,PKT,<switch>
AP? WDM, PKT
```

Response Data

```
WDM,PKT,<switch>
```

<switch>: MAX|THRESHOLD

Example of Use

```
AP WDM,PKT,MAX
AP? WDM,PKT
>WDM,PKT,MAX
```

AP WDM,REL [Application (WDM Relative)]

Function

This command changes display to Relative at the WDM application and sets the reference wavelength number.
When the parameter is omitted, the wavelength number is not changed.

Syntax

```
AP WDM,REL,<numeric_value>
AP? WDM,REL
```

Response Data

```
WDM,REL,<numeric_value>
```

<numeric_value>: Sets Peak No. (1 to 300) used as Ref No
Reference wavelength number

Example of Use

```
AP WDM,REL,1
AP? WDM,REL
>WDM,REL,1
```

AP WDM,SIGNAL,LV [Application (WDM Signal Level)]

Function

This command sets and queries the level detection method in Signal Parameter for WDM application.

Syntax

```
AP WDM,SIGNAL,LV,{INTG[,<numeric_value>]|POINT}
AP? WDM,SIGNAL,LV
```

Response Data

```
WDM,SIGNAL,LV,INTG|POINT,<numeric_value>
```

Parameter 1: Sets Detection Type
INTG: ΣPower
POINT: Point

Parameter 2: Signal Span
<numeric_value>: 0.01 to 50.00 (nm)
When the second parameter is omitted, Signal Span is not changed.

Example of Use

```
AP WDM,SIGNAL,LV,INTG,0.50
AP? WDM,SIGNAL,LV
>WDM,SIGNAL,LV,INTG,0.50
```

AP WDM,SIGNAL,WL [Application (WDM Signal Wavelength)]

Function

This command sets and queries the wavelength detection method in Signal Parameter for WDM application.

Syntax

```
AP WDM,SIGNAL,WL,{PEAK|THRESHOLD[,<numeric_value>]}
AP? WDM,SIGNAL,WL
```

Response Data

```
WDM,SIGNAL,LV,PEAK|THRESHOLD,<numeric_value>
```

Parameter 1: Sets Detection Type
PEAK
THRESHOLD

Parameter 2: Threshold Cut Level
<numeric_value>: 0.1 to 50.0 (dB)
When the second parameter is omitted, Threshold Cut Level is changed.

Example of Use

```
AP WDM,SIGNAL,WL,THRESHOLD,25
AP? WDM,SIGNAL,LWL
>WDM,SIGNAL,WL,THRESHOLD,25.0
```

AP WDM,SLV [Application (WDM Slice Level)]

Function

This command sets and queries Slice Level in Signal Parameter at WDM application.

Syntax

```
AP WDM,SLV,<numeric_value>
AP? WDM, SLV
```

Response Data

```
WDM,SLV,<numeric_value>
```

<numeric_value>: Sets Slice Level (dB) 0.1 to 50.0 dB

Example of Use

```
AP WDM,SLV,0.1
AP? WDM,SLV
>WDM,SLV,0.1
```

AP WDM,SNR [Application (WDM SNR)]

Function

This command changes the screen display to SNR at the WDM application.
To set the signal and noise measurement parameter, use AP WDM,NNRMZ, AP WDM,NOISE, AP WDM,SIGNAL,LV, and AP WDM,SIGNAL,WL.
This command queries the noise parameter for WDM application. However, the following data cannot be read:

- Noise Parameter:Normalization
- Noise Parameter:Point
- Noise Position

To read other measurement parameters, use AP WDM,NNRMZ, AP WDM,NOISE, AP WDM,SIGNAL,LV, and AP WDM,SIGNAL,WL.

When the WDM application parameter is set using this command, the Noise Parameter is set as follows:

- Detection Type:Point
- Noise BW:1.0

To avoid changing the Noise Parameter settings, omit the parameter and use AP WDM, or SNR.

Syntax

```
AP WDM,SNR,<switch>,<numeric_value>[,<switch>]
AP? WDM,SNR
```

Response Data

```
WDM,SNR,<switch>,<numeric_value>,<switch>
```

No.	Parameter type	Range	Description
1.	<switch>	AVERAGE|HIGHER|LEFT|RIGHT	Sets measurement method of noise level.
2.	<numeric_value>	0.01 to 20.00 |Off	Noise Position (nm) Wavelength differences when measuring noise level
3.	<switch>	OFF|ON	Normalization using actual resolution OFF: No normalization processing ON: Normalization processing

Example of Use

```
AP WDM
AP WDM,NNRMZ ON,0.5
AP WDM,NOISE,POINT,HIGHER,0.8
AP? WDM,SNR
>WDM,SNR,HIGHER,0.80,ON
```

AP WDM,STHR [Application (WDM Search Threshold)]

Function

This command sets or queries the threshold to detect peak (channel) in the WDM measurement.

Syntax

```
AP WDM,STHR,<numeric_value>
AP? WDM,STHR
```

Response Data

```
WFIL,SDM,<numeric_value>
```

<numeric_value>: Search Threshold (dB) 0.01 to 10.00

Example of Use

```
AP WDM,STHR,0.1
AP? WDM,STHR
>WDM,STHR,0.10
```

AP WDM,TBL [Application (WDM Table)]

Function

This command changes the screen display to Table at the WDM application.

To set the signal and noise measurement parameter, use AP WDM,NNRMZ, AP WDM,NOISE, AP WDM,SIGNAL,LV, and AP WDM,SIGNAL,WL. This command queries the noise parameter for WDM application.

However, the following data cannot be read:

- Noise Parameter:Normalization
- Noise Parameter:Point
- Noise Position

To read other measurement parameters, use AP WDM,NNRMZ, AP WDM,NOISE, AP WDM,SIGNAL,LV, and AP WDM,SIGNAL,WL.

When the WDM application parameter is set using this command, the Noise Parameter is set as follows:

- Detection Type:Point
- Noise BW:1.0

To avoid changing the Noise Parameter settings, omit the parameter and use AP WDM, or TBL.

Syntax

```
AP WDM,TBL[,<switch>,<numeric_value>[,<switch>]]
AP? WDM,TBL
```

Response Data

```
WDM,TBL,<switch>,<numeric_value>,<switch>
```

No.	Parameter type	Range	Description
1	<switch>	AVERAGE|HIGHER|LEFT|RIGHT	Sets measurement method of noise level.
2	<numeric_value>	0.01 to 20.00 |Off	Noise Position (nm) Wavelength differences when measuring noise level
3	<switch>	OFF|ON	Normalization using actual resolution OFF: No normalization processing ON: Normalization processing

Example of Use

```
AP WDM,TBL
AP WDM NOISE,POINT
AP WDM NOISE,POINT,HIGHER,0.8
```

```
AP WDM,NNRMZ,ON,0.2
AP? WDM,TBL
>WDM,TBL,HIGHER,0.80,ON
```

AP WDM,TCL [Application (WDM ThresholdCutLevel)]

Function

This command sets and queries the cut level of the Signal Parameter Threshold method at WDM application.

Syntax

```
AP WDM,TCL,<numeric_value>
AP? WDM,TCL
```

Response Data

```
WDM,TCL,<numeric_value>
```

<numeric_value>: Sets Cut Level (0.1 to 50.0 dB) for signal wavelength calculation at Threshold analysis

Example of Use

```
AP WDM,TCL,10
AP? WDM,TCL
>WDM,TCL,10.0
```

AP WFIL [Application (WDM Filter)]

Function

This command specifies parameters and executes the WDM filter application.

Syntax

```
AP WFIL,<switch>,<parameter>,,
```

The number of <parameter> varies depending on the status of <switch>.

```
AP? WFIL
```

Response Data

```
WFIL
```

<switch>	Details
BWCL	Selects the measurement method of bandwidth.
CHDT	Selects the detection type of channel wavelength.
LVL	Selects the channel level measurement method.
RPS	Sets the ripple span.
SLV	Sets the slice level for detecting channel.
STHR	Sets the threshold value for detecting channel.
TCL	Sets the cut level for calculating wavelength by threshold analysis.

Example of Use

```
AP WFIL
AP? WFIL
>WFIL
```

AP WFIL,BWCL [Application (WDM Filter BW/Pass Band)]

Function

This command sets and queries the BW/Pass Band parameters in Test Parameter for WDM filter application.

Syntax

```
AP WFIL,BWCL,<switch>,<numeric_value>,<numeric_value>
[,<numeric_value>]
AP? WFIL,BWCL
```

Response Data

```
WFIL,BWCL <switch>,<numeric_value>,<numeric_value>
[,<numeric_value>]
```

No.	Parameter type	Range	Description
1	<switch>	BW| PASSBAND	Analysis Type
2	<numeric_value>	0.1 to 50.0	Cut Level A (dB)
3	<numeric_value>	0.1 to 50.0	Cut Level B (dB)
4	<numeric_value>	0.01 to 999.99	Pass Band Span (nm)

If No. 4 parameter is omitted when setting, the Pass Band Span is not changed.

Example of Use

```
AP WFIL,BWCL,PASSBAND,3.00,20.00,0.05
AP? WFIL,BWCL
>WFIL,BWCL,PASSBAND,3.00,20.00,0.05
```

AP WFIL,CHDT [Application (WDM Filter Channel Detection)]

Function

This command sets and queries the channel wavelength detection method in Test Parameter for WDM filter application.

Syntax

```
AP WFIL,CHDT,<switch>[,<numeric_value>]
AP? WFIL,CHDT
```

Response Data

```
WFIL,CHDT,<switch>[,<numeric_value>]
```

No.	Parameter type	Range	Description
1	<switch>	PEAK|RMS|THRESHOLD	Channel Detection Type
2	<numeric_value>	0.1 to 50.0	Cut Level (dB)

If No. 2 parameter is omitted when setting, the Cut Level is not changed.

Example of Use

```
AP WFIL,CHDT,PEAK,10
AP? WFIL,CHDT
>WFIL,CHDT,PEAK
AP WFIL,CHDT,THRESHOLD,3
AP? WFIL,CHDT
>WFIL,CHDT,THRESHOLD,3.0
```

AP WFIL,LVL [Application (WDM Filter Channel Detection)]

Function

This command sets and queries the channel level detection method in Test Parameter for WDM filter application.

Syntax

```
AP WFIL,LVL,{INTG|POINT[,<numeric_value>] }
AP? WFIL,LVL
```

Response Data

```
WFIL,LVL,{INTG,<numeric_value>|POINT}
```

Parameter 1: Sets Detection Type
INTG: ΣPower
POINT: Point

Parameter 2: Signal Span (nm)
<numeric_value>:0.01 to 50.00
If No. 2 parameter is omitted when setting, Signal Span is not changed.

Example of Use

```
AP WFIL,LVL,INTG,0.50
AP? WFIL,LVL
>WFIL,LVL,INTG,0.50
```

AP WFIL,RPS [Application (WDM Filter Ripple Span]

Function

This command sets and queries the ripple span in Test Parameter for WDM filter application.

Syntax

```
AP WFIL,RPS,<numeric_value>
AP? WFIL,RPS
```

Response Data

```
WFIL,RPS,<numeric_value>
```

<numeric_value>: Ripple Span 0.01 to 999.99 (nm)

Example of Use

```
AP WFIL,RPS,1.5
AP? WFIL,RPS
>WFIL,RPS,1.50
```

AP WFIL,SLV [Application (WDM Filter Slice Level]

Function

This command sets and queries the slice level for detecting channel at WDM filter application.

Syntax

```
AP WFIL,SLV,<numeric_value>
AP? WFIL,SLV
```

Response Data

```
WFIL,SLV,<numeric_value>
```

<numeric_value>: Slice level (dB) 0.1 to 50.0

Example of Use

```
AP WFIL,SLV,32
AP? WFIL,SLV
>WFIL,SLV,32.0
```

AP WFIL,STHR [Application (WDM Filter Search Threshold)]

Function

This command sets and queries the threshold value for detecting channel at WDM filter application.

Syntax

```
AP WFIL,STHR,<numeric_value>
AP? WFIL,STHR
```

Response Data

```
WFIL,STHR,<numeric_value>
```

<numeric_value>: Search Threshold (dB) 0.01 to 10.00

Example of Use

```
AP WFIL,STHR,0.1
AP? WFIL,STHR
>WFIL,STHR,0.10
```

AP WFIL,TCL [Application (WDM Filter Threshold Cut Level)]

Function

This command sets and queries the threshold value for detecting wavelength at WDM filter application.

Syntax

```
AP WFIL,TCL,<numeric_value>,<numeric_value>
AP? WFIL,TCL
```

Response Data

```
WFIL,TCL,<numeric_value>,<numeric_value>
```

Parameter 1: Cut Level A (dB)
Parameter 2: Cut Level B (dB)
<numeric_value>: Cut Level 0.1 to 50.0 (dB)

Example of Use

```
AP WFIL,TCL,3,20
AP? WFIL,TCL
>WFIL,TCL,3.0,20.0
```

APR [Application Result]

Function

This command queries the analysis results for the last application executed by the AP command.

Syntax

```
APR?
```

Response Data

```
<numeric_value>
```

The response data varies with the application function.
The details of the response for each application are described separately below.

When executing the Optical Amp application

No.	Parameter type	Description
1	<numeric_value>	Gain: Gain (dB)
2	<numeric_value>	NF: Noise figure (dB)
3	<numeric_value>	Signal Wl: Peak wavelength of amplified light (nm)
4	<numeric_value>	ASE Lvl/(Res): ASE level of amplified light (dBm)
5	<numeric_value>	Res: Actual resolution use used for the NF calculation (nm)

When executing the Optical AMP (WDM) application

No.	Parameter type	Description
1	<numeric_value>	PeakCount: Number of peaks
2	<numeric_value>	Gain Slope: The gain slope (dB/nm)
3	<numeric_value>	Gain Vari: Difference between the maximum and the minimum gain values in the entire signal spectrum (dB)
4	<numeric_value>	Wl: 1st peak wavelength (nm)
5	<numeric_value>	Pin: 1st optical level input (dBm)
6	<numeric_value>	Pout: 1st optical level output (dBm)
7	<numeric_value>	ASE: 1st amplified spontaneous emission level (dBm)
8	<numeric_value>	Res: 1st actual resolution (nm)
9	<numeric_value>	Gain: 1st gain (dB)
10	<numeric_value>	NF: 1st Noise Figure (dB)
	:	
7n-3	<numeric_value>	Wl: n th peak wavelength (nm)
7n-2	<numeric_value>	Pin: n th optical level input (dBm)
7n-1	<numeric_value>	Pout: n th optical level output (dBm)
7n	<numeric_value>	ASE: n th amplified spontaneous emission level (dBm)
7n+1	<numeric_value>	Res: n th actual resolution (nm)
7n+2	<numeric_value>	Gain: n th gain (dB)
7n+3	<numeric_value>	NF: n th Noise Figure (dB)

When executing the DFB-LD application

No.	Parameter type	Description
1	<numeric_value>	SMSR: Side mode suppression ratio (dB)
2	<numeric_value>	ko: Spectrum width used by RMS method (nm)
3	<numeric_value>	Peak: Peak wavelength (nm)
4	<numeric_value>	Peak: Peak level (dBm)
5	<numeric_value>	2nd Peak: Side mode wavelength (nm)
6	<numeric_value>	2nd Peak: Side mode level (dBm)
7	<numeric_value>	Mode Offset: Differences between side mode wavelength and peak wavelength (nm)
8	<numeric_value>	Stop Band: Wavelength difference of both side modes of peak wavelength (nm)
9	<numeric_value>	Center Offset: Difference of means of peak wavelength and both side modes wavelength (nm)
10	<numeric_value>	σ: Standard deviation (nm)

When executing the FP-LD application

No.	Parameter type	Description
1	<numeric_value>	FWHM: Spectrum width using RMS method (nm)
2	<numeric_value>	Mean Wl: Center wavelength (nm)
3	<numeric_value>	Peak: Peak wavelength (nm)
4	<numeric_value>	Peak: Peak level (dBm)
5	<numeric_value>	Mode (n dB): Number of longitudinal modes
6	<numeric_value>	Mode Spacing: Longitudinal mode interval (gap) (nm)
7	<numeric_value>	Total Power: Spectrum integral power (dBm)
8	<numeric_value>	σ: Standard deviation using RMS method (nm)

When executing the LD Module application

No.	Parameter type	Description
1	<numeric_value>	Kσ: Spectrum width (nm)
2	<numeric_value>	σ: Standard deviation (nm)
3	<numeric_value>	2nd Peak: Side mode wavelength (nm)
4	<numeric_value>	2nd Peak: Side mode level (dBm)
5	<numeric_value>	Mode Offset: Differences between side mode wavelength and peak wavelength (nm)
6	<numeric_value>	SMSR: Side mode suppression ratio (dB)
7	<numeric_value>	Peak: Peak wavelength (nm)
8	<numeric_value>	Peak: Peak level (dBm)
9	<numeric_value>	SNR (/1nm): Signal to noise ratio (per nm) (dB)
10	<numeric_value>	SNR (Res **nm): Signal to noise ratio (true value) (dB)

When executing the LED application

No.	Parameter type	Description
1	<numeric_value>	Mean Wl (FWHM): Center wavelength of spectrum half width (nm)
2	<numeric_value>	Mean Wl (ndB): Center wavelength using ndB Loss method (nm)
3	<numeric_value>	FWHM (n σ): Spectrum half width for RMS (nm)
4	<numeric_value>	n dB Width: Spectrum width using dB Loss method (nm)
5	<numeric_value>	Peak: Peak wavelength (nm)
6	<numeric_value>	Peak: Peak level (dBm)
7	<numeric_value>	PkDens (/1nm): Spectrum density max. value (dBm)
8	<numeric_value>	Total Power: Spectrum integral power (dBm)
9	<numeric_value>	σ: Standard deviation differences using RMS method (nm)

When executing the PMD application

No.	Parameter type	Description
1	<numeric_value>	Diff Group Delay: Δt differential group delay time (fs)
2	<numeric_value>	1st Peak Wl: Wavelength of 1st peak (nm)
3	<numeric_value>	Last Peak Wl: Wavelength of last peak (nm)
4	<numeric_value>	Peak Count

When executing the WDM application (MultiPeak)

No.	Parameter type	Description
1	<numeric_value>	PeakCount
2	<numeric_value>	Wl: First peak wavelength (nm)
3	<numeric_value>	Level: First peak level (dBm)
	:	
2n	<numeric_value>	Wl: n th peak wavelength (nm)
2n+1	<numeric_value>	Level: n th peak level (dBm)

When executing the WDM application (SNR)

No.	Parameter type	Description
1	<numeric_value>	Peak Count
2	<numeric_value>	Wl: First peak wavelength (nm)
3	<numeric_value>	Level: First peak level (dBm)
4	<numeric_value>	SNR: First signal to noise ratio (dB)
5	<switch> = AVERAGE | LEFT | RIGHT | ERR | FITTING	L/R: First noise detection method ERR when noise position off screen at noise detection FITTING when Noise Parameter Detection Type is Area
	:	
4n–2	<numeric_value>	Wl: n th peak wavelength (nm)
4n–1	<numeric_value>	Level: n th peak level (dBm)
4n	<numeric_value>	SNR: nth peak signal to noise ratio (dB)
4n+1	<switch>= AVERAGE | LEFT | RIGHT | ERR | FITTING	L/R: nth peak noise detection method ERR when noise position off screen at noise detection FITTING when Noise Parameter Detection Type is Area

When executing the WDM application (Relative)

No.	Parameter type	Description
1	<numeric_value>	Peak Count
2	<numeric_value>	Ref: Reference peak number
3	<numeric_value>	Wl: First peak wavelength (nm)
4	<numeric_value>	Spacing: Spacing of first peak wavelength (nm)
5	<numeric_value>	Wl-Ref: Wavelength difference between first peak and reference peak (nm)
6	<numeric_value>	Level: First peak level (dBm)
7	<numeric_value>	Level-Ref: First relative level (dB)
	:	
5n–2	<numeric_value>	Wl: nth peak wavelength (nm)
5n–1	<numeric_value>	Spacing: Spacing of nth peak wavelength (nm)
5n	<numeric_value>	Wl-Ref: Differences between nth peak and reference peak wavelength (nm)
5n+1	<numeric_value>	Level: nth peak level (dBm)
5n+2	<numeric_value>	Level-Ref: nth relative level (dB)

The first peak wavelength spacing is normally 0.

When executing the WDM application (Table)

No.	Parameter type	Description
1	<numeric_value>	PeakCount
2	<numeric_value>	SignalWl: First peak wavelength (nm)
3	<numeric_value>	Signal Frq: First peak frequency (THz)
4	<numeric_value>	Level: First peak level (dBm)
5	<numeric_value>	SNR: First peak signal to noise ratio (dB)
6	<switch>= AVERAGE|LEFT|RIGHT|ERR|FITTING	L/R: First peak noise detection method ERR when noise position off screen at noise detection FITTING when Noise Parameter Detection Type is Area
7	<numeric_value>	Spacing Wl: First peak wavelength spacing (nm)
8	<numeric_value>	Spacing Frq: First peak frequency spacing (GHz)
	:	
7n–5	<numeric_value>	Signal Wl: nth peak wavelength (nm)
7n–4	<numeric_value>	Signal Frq: nth peak frequency (THz)
7n–3	<numeric_value>	Level: nth peak level (dBm)
7n–2	<numeric_value>	SNR: nth peak signal to noise ratio (dB)
7n–1	<switch> = AVERAGE|LEFT|RIGHT|ERR	L/R: nth peak noise detection method ERR when noise position off screen at noise detection
7n	<numeric_value>	Spacing Wl: nth peak wavelength spacing (nm)
7n+1	<numeric_value>	Spacing Frq: nth peak frequency spacing (GHz)

If there is no peak, the returned values are wavelength λ = –1, level L = –999.99 or 999.99.

When executing the WDM Filter application

No.	Parameter type	Description
1	<numeric_value>	PeakCount: Channel count
2	<numeric_value>	No: Channel number
3	<numeric_value>	CH Wl: 1st channel wavelength (nm)
4	<numeric_value>	Spacing: 1st channel spacing (nm)
5	<numeric_value>	PK Wl: 1st peak wavelength (nm)
6	<numeric_value>	CH Lvl: 1st channel level (dBm) or 1st channel loss (dB)
7	<numeric_value>	x dB BW: 1st channel bandwidth (Cut Level A) (nm)
8	<numeric_value>	y dB BW: 1st channel bandwidth (Cut Level B) (nm)
9	<numeric_value>	x dB Wl: Threshold wavelength of the 1st channel (Cut Level A) (nm)
10	<numeric_value>	y dB Wl: Threshold wavelength of the 1st channel (Cut Level B) (nm)
11	<numeric_value>	PK Lvl: Peak level (dBm) or minimum loss (dB) of the 1st channel
12	<numeric_value>	Ripple: 1st channel ripple (dB)
	:	
11n–9	<numeric_value>	No: Channel number
11n–8	<numeric_value>	CH Wl: nth channel wavelength (nm)
11n–7	<numeric_value>	Spacing: nth channel interval (nm)
11n–6	<numeric_value>	PK Wl: nth peak wavelength (nm)
11n–5	<numeric_value>	CH Lvl: nth channel level (dBm) or nth channel loss (dB)
11n–4	<numeric_value>	x dB BW: nth channel bandwidth (Cut Level A) (nm)
11n–3	<numeric_value>	y dB BW: nth channel bandwidth (Cut Level B) (nm)
11n–2	<numeric_value>	x dB Wl: nth channel threshold wavelength (Cut Level A) (nm)
11n–1	<numeric_value>	y dB Wl: nth channel threshold wavelength (Cut Level B) (nm)
11n	<numeric_value>	PK Lvl: Peak level (dBm) or minimum loss (dB) of nth channel
11n+1	<numeric_value>	Ripple: nth channel ripple (dB)

The spacing of the 1st peak wavelength is always “0”.

APR AMP2,TBL [Application Result (Optical Amp Multi Channel Application)]

Function

This command the analysis results by the Optical AMP (WDM) application function, specifying the peak No.

Syntax

```
APR? AMP2,TBL,<numeric_value>
```

<numeric_value>: Peak No. to queries the analysis results

Response Data

```
AMP2,TBL,<numeric_value>,<numeric_value>,<numeric_value>
,<numeric_value>,<numeric_value>,<numeric_value>,<numeri
c_value>
```

No.	Parameter type	Description
1	<numeric_value>	Wl: Peak wavelength (nm) for the specified peak No.
2	<numeric_value>	Pin: Optical level input (dBm) for the specified peak No.
3	<numeric_value>	Pout: Optical level output (dBm) for the specified peak No.
4	<numeric_value>	ASE: Amplified spontaneous emission level (dBm) for the specified peak No.
5	<numeric_value>	Res: Actual resolution (nm) for the specified peak No.
6	<numeric_value>	Gain: Gain (dB) for the specified peak No.
7	<numeric_value>	NF: Noise Figure (dB) for the specified peak No.

Examples of Use:

```
APR? AMP2,TBL,1
>AMP2,TBL,1546.815,-34.06,-8.72,-25.29,0.089,25.88,7.26
```

APR DFBNDW [Application Result (DFB-LD ndB Width)]

Function

This command queries the DFB-LD application analysis results executed by the AP command.
This command queries the ndB-Width analysis result, which cannot be queried with the APR.

Syntax

```
APR? DFBNDW
```

Response Data

```
DFBNDW,<numeric_value>,,,,<numeric_value>
```

No.	Parameter type	Description
1	<numeric_value>	SMSR: Side mode suppression ratio (dB)
2	<numeric_value>	Kσ: Spectrum width (nm)
3	<numeric_value>	Peak: Peak wavelength (nm)
4	<numeric_value>	Peak: Peak level (dBm)
5	<numeric_value>	2nd Peak: Side mode wavelength (nm)
6	<numeric_value>	2nd Peak: Side mode level (dBm)
7	<numeric_value>	Mode Offset: Difference bewteen side mode wavelength and peak wavelength (nm)
8	<numeric_value>	Stop Band: Wavelength difference of both side modes of peak wavelength (nm)
9	<numeric_value>	Center Offset: Difference of means of peak wavelength and both side modes wavelength (nm)
10	<numeric_value>	σ: Standard deviation (nm)
11	<numeric_value>	NDW: Spectrum wavelength width at cut level (nm)

Example of Use

```
APR? DFBNDW
>DFBNDW,33.05,2.337,1551.458,-3.45,1553.664,-36.50,2.206
,7.897,0.1134,0.761,0.994
```

APR LDNDW [Application Result (LD Module ndB Width)]

Function

This command queries the LD Module application results executed by the AP command.
The APR command response plus the below data is returned to this command.
Signal, NDW

Syntax

```
APR? LDNDW
```

Response Data

```
LDNDW,<numeric_value>,,,,<numeric_value>
```

No.	Parameter type	Description
1	<numeric_value>	Kσ: Spectrum width (nm)
2	<numeric_value>	σ: Standard deviation (nm)
3	<numeric_value>	2nd Peak: Side mode wavelength (nm)
4	<numeric_value>	2nd Peak: Side mode level (dBm)
5	<numeric_value>	Mode Offset: Difference between side mode wavelength and peak wavelength (nm)
6	<numeric_value>	SMSR: Side mode suppression ratio (dB)
7	<numeric_value>	Peak: Peak wavelength (nm)
8	<numeric_value>	Peak: Peak level (dBm)
9	<numeric_value>	SNR (/*.*nm): Signal-noise ratio (noise level per noise bandwidth) (dB)
10	<numeric_value>	SNR(Res **nm): Signal-noise ratio (actual value) (dB)
11	<numeric_value>	Signal: Signal wavelength (nm)
12	<numeric_value>	Signal: Signal level (dBm)
13	<numeric_value>	NDW: Spectrum wavelength width at cut level (nm)

Example of Use

```
APR? LDNDW
>DFBNDW,0.125,0.053,1546.119,-33.31,2.104,39.56,1548.223
,6.25,44.61,41.65,1548.209,5.22,0.086
```

APR LDSBCO [Application Result (LD Module Stop Band and Center Offset)]

Function

This command queries the LD Module application results executed by the AP command.
The APR command response plus the below data is returned to this command.
Signal, NDW, Stop Band, Center Offset

Syntax

```
APR? LDSBCO
```

Response Data

```
LDSBCO,<numeric_value>,,,,<numeric_value>
```

No.	Parameter type	Description
1	<numeric_value>	Kσ: Spectrum width (nm)
2	<numeric_value>	σ: Standard deviation (nm)
3	<numeric_value>	2nd Peak: Side mode wavelength (nm)
4	<numeric_value>	2nd Peak: Side mode level (dBm)
5	<numeric_value>	Mode Offset: Difference bewteen side mode wavelength and peak wavelength (nm)
6	<numeric_value>	SMSR: Side mode suppression ratio (dB)
7	<numeric_value>	Peak: Peak wavelength (nm)
8	<numeric_value>	Peak: Peak level (dBm)
9	<numeric_value>	SNR(/*.*nm): Signal-noise ratio (noise level per noise bandwidth) (dB)
10	<numeric_value>	SNR(Res **nm): Signal-noise ratio (actual value) (dB)
11	<numeric_value>	Signal: Signal wavelength (nm)
12	<numeric_value>	Signal: Signal level (dBm)
13	<numeric_value>	NDW: Spectrum wavelength width at cut level (nm)
14	<numeric_value>	Stop Band: Wavelength difference of both side modes of peak wavelength (nm)
15	<numeric_value>	Center Offset: Difference of means of peak wavelength and both side modes wavelength (nm)

Example of Use

```
APR? LDSBCO
>LDSBCO,0.204,0.034,1554.34,-42.94,0.62,47.39,1554.96,4.
45,43.83,54.05,1554.96,4.45,0.198,1.56,0.16
```

APR LDSNR [Application Result (LD Module SNR)]

Function

This command queries the SNR measurement result after LD module application. This command queries optical signal wavelength and level, which cannot be queried with the APR.

Syntax

```
APR? LDSNR
```

Response Data

```
LDSNR,<numeric_value>,,,,<numeric_value>
```

No.	Parameter type	Description
1	<numeric_value>	Kσ: Spectrum width (nm)
2	<numeric_value>	σ: Standard deviation (nm)
3	<numeric_value>	2nd Peak: Side mode wavelength (nm)
4	<numeric_value>	2nd Peak: Side mode level (dBm)
5	<numeric_value>	Mode Offset: Difference bewteen side mode wavelength and peak wavelength (nm)
6	<numeric_value>	SMSR: Side mode suppression ratio (dB)
7	<numeric_value>	Peak: Peak wavelength (nm)
8	<numeric_value>	Peak: Peak level (dBm)
9	<numeric_value>	SNR(/*.*nm): Signal-noise ratio (noise level per noise bandwidth) (dB)
10	<numeric_value>	SNR(Res **nm): Signal-noise ratio (actual value) (dB)
11	<numeric_value>	Signal: Signal wavelength (nm)
12	<numeric_value>	Signal: Signal level (dBm)

Example of Use

```
APR? LDSNR
>LDSNR,23.721,3.908,1359.2,-16.44,8.9,4.12,1350.3,-12.31
,31.01,30.59,1350.3,-12.31
```

APR MPKC [Application Result (Multi Peak Counter)]

Function

This command queries the number of the detected multi peaks.

Syntax

```
APR? MPKC
```

Response Data

```
MPKC,<numeric_value>
```

<numeric_value>: Multi peak count

Example of Use

```
APR? MPKC
>MPKC,1
```

APR WDM [Application Result (WDM Application)]

Function

This command queries the analysis results of the WDM application function for the specified peak No.

Syntax

```
APR? WDM[,<switch>,<parameter>,,]
```

The number of <parameter> varies depending on the status of <switch>.

Response Data

```
[WDM,<switch>,]<parameter>,,
```

The number of <parameter> varies depending on the status of <switch>.If the query <switch> is omitted, the response data is <parameter> only.

<switch>	Processing
None	Captures analysis results as batch
MPK	Multi Peak: Captures analysis results at multi-peak display for specified peak No.
REL	Relative: Captures analysis results at relative display for specified peak No.
SNR	SNR: Captures analysis results at SNR display for specified peak No.
TBL	Table: Captures analysis results at list display for specified peak No.

Example of Use

```
APR? WDM,MPK,1
>WDM,MPK,1552.76,-1.9
```

APR WDM,MPK [Application Result (WDM Application MultiPeak Display)]

Function

This command queries the analysis results at the MultiPeak display of the WDM application function for the specified peak No.

Syntax

```
APR? WDM,MPK,<numeric_value>
```

<numeric_value>: No. of peak to query analysis results

Response Data

```
WDM,MPK,<numeric_value>,<numeric_value>
```

No.	Parameter type	Description
1	<numeric_value>	Peak wavelength of specified peak (nm)
2	<numeric_value>	Peak level of specified peak (dBm)

Example of Use

```
APR? WDM,MPK,1
>WDM,MPK,1552.76,-1.9
```

APR WDM,REL [Application Result (WDM Application Relative Display)]

Function

This command queries the analysis results at the Relative display of the WDM application function for the specified peak No.

Syntax

```
APR? WDM,REL,<numeric_value>
```

<numeric_value>: No. of peak to query analysis results

Response Data

```
WDM,REL,<numeric_value>,<numeric_value>,<numeric_value>,
<numeric_value>,<numeric_value>
```

No.	Parameter type	Description
1	<numeric_value>	Peak wavelength of specified peak No. (nm)
2	<numeric_value>	Specified peak No. peak wavelength spacing (nm)
3	<numeric_value>	Wavelength difference between specified No. peak wavelength and reference peak (nm)
4	<numeric_value>	Specified peak No. peak level (dBm)
5	<numeric_value>	Specified peak No. relative level (dB)

Example of Use

```
APR? WDM,REL,1
>WDM,REL,1552.76,0,0,-1.9,0
```

APR WDM,SNR [Application Result (WDM Application SNR Display)]

Function

This command queries the analysis results at the SNR display of the WDM application function for the specified peak No.

Syntax

```
APR? WDM,SNR,<numeric_value>
```

<numeric_value>: No. of peak to query analysis results

Response Data

```
WDM,SNR,<numeric_value>,<numeric_value>,<numeric_value>,
<numeric_value>
```

No.	Parameter type	Description
1	<numeric_value>	Peak wavelength of specified peak (nm)
2	<numeric_value>	Peak level of specified peak (dBm)
3	<numeric_value>	Signal to noise ratio of specified peak (dB)
4	<switch>= AVERAGE|LEFT|RIGHT|ERR|FITTING	Noise detection method for specified peak ERR when noise position off screen at noise detection FITTING when Noise Parameter Detection Type is Area

Example of Use

```
APR? WDM,SNR,1
> WDM,SNR,1552.76,-1.9,51.54,RIGHT
```

APR WDM,SNR,GAV [Application Result (WDM Application SNR Display GAV)]

Function

This command queries the gain variation results at the SNR display of the WDM application function.

Syntax

```
APR? WDM,SNR,GAV
```

Response Data

```
<numeric_value>
```

<numeric_value>:	Gain variation (dB) Difference between max and min values of peaks in full signal spectrum

Example of Use

```
APR? WDM,SNR,GAV
>10.23
```

APR WDM,TBL [Application Result (WDM Application Table Display)]

Function

This command queries the analysis results at the Table display of the WDM application function for the specified peak No.

Syntax

```
APR? WDM,TBL,<numeric_value>
```

<numeric_value>: No. of peak to query analysis results

Response Data

```
WDM,REL,<numeric_value>,<numeric_value>,<numeric_value>,
<numeric_value>,<numeric_value>,<numeric_value>,<numeric
_value>
```

No.	Parameter type	Description
1	<numeric_value>	Specified peak No. peak wavelength (nm)
2	<numeric_value>	Specified peak No. peak frequency (THz)
3	<numeric_value>	Peak level of specified peak (dBm)
4	<numeric_value>	Signal to noise ratio of specified peak (dB)
5	<switch>= AVERAGE|LEFT|RIGHT|ERR|FITTING	Specified peak No. noise detection method ERR when noise position off screen at noise detection FITTING when Noise Parameter Detection Type is Area
6	<numeric_value>	Specified peak No. peak wavelength spacing (nm)
7	<numeric_value>	Specified peak No. peak frequency spacing (GHz)

Example of Use

```
APR? WDM,TBL,1
>WDM,TBL,1552.76,193.0707,-1.9,51.54,RIGHT,0,0
```

ARED [Actual Resolution Data]

Function

This command queries the actual resolution.

Syntax

```
ARED?
```

Response Data

<numeric_value> Actual resolution (nm)

ARES [Actual Resolution]

Function

This command sets display of the actual resolution.
The actual resolution display status is queried.

Syntax

```
ARES OFF|ON
ARES?
```

Response Data

```
OFF|ON
```

OFF: Does not display the actual resolution.
ON: Displays the actual resolution.

ATT [Optical Attenuator]

Function

This command sets the internal optical attenuator.
This command queries the internal optical attenuator status.

Syntax

```
ATT OFF|ON
ATT?
```

Response Data

```
OFF|ON
```

OFF: Does not use the optical attenuator.
ON: Uses the optical attenuator.

AUT [Auto Measure]

Function

This command performs the measurement automatically.
Bit 0 of the end event status register is set to 1 when measurement ends.
This command queries the automatic measurement status.

Syntax

```
AUT
AUT?
```

Response Data

```
0|1
```

0: Measurement end (Both successful end and failed end)

1: Measurement in progress

Confirm whether the measurement ends successfully or not using the query command ERR. If the measurement succeeds, the message code is 0. On the other hand, if the measurement fails, the message code is 100.

Example of Use

```
AUT?
> 0
ERR?
> 0
```

AVS [Sweep Average]

Function

This command sets the average processing (sweep averaging) count.
This command queries the average processing (sweep averaging) count.

Syntax

```
AVS <numeric_value>
AVS?
```

Response Data

```
<numeric_value>
```

<numeric_value>: Sweep averaging setting count 1 to 1000

AVT [Point Average]

Function

This command sets and queries the average processing (point averaging) count.

Syntax

```
AVT <numeric_value>|OFF
AVT?
```

Response Data

```
<numeric_value>|OFF
```

<numeric_value>: Point averaging setting count 2 to 1000
OFF: Point averaging OFF

BUZ [Buzzer]

Function

This command sets and queries the On/Off status of the buzzer.
This message is a system management command.

Syntax

```
BUZ OFF|ON
BUZ?
```

OFF: Disable the buzzer.
ON: Enable the buzzer.

Response Data

```
BUZ OFF|ON
```

CNT [Center Wavelength]

Function

This command sets and queries the center wavelength.

Syntax

```
CNT <numeric_value>
CNT?
```

Response Data

```
<numeric_value>
```

`<numeric_value>:` The center wavelength can include up to two digits following the values from 600.00 to 1750.00.

COLOR [Image Color Setting]

Function

Pressing **Copy** sets and queries the color of the image file to be saved. This message is a system management command.

Syntax

```
COLOR NORMAL|REVERSE
COLOR?
```

NORMAL: Creates graphics file using same colors as screen display.
REVERSE: Creates graphics file using reverse screen colors.

Response Data

```
NORMAL|REVERSE
```

CPCOPYDAT [Copy Image Data]

Function

This command copies the graphics file from drives E to Z to drive D.
The extension (bmp or png) of the copied file is specified at Copy Settings.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
The copy source graphics file should be saved to the following folder of the specified drive.
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Screenshot
This message is a system management command.

Syntax

```
CPCOPYDAT <file_name>,<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
CPCOPYDAT "LED_125M(025)",E
```

CPCSV [Copy CSV Data]

Function

This command copies the trace CSV file from drives E to Z to drive D.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
The copy source CSV file should be saved to the following folder of the specified drive.
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\CSV Data
This message is a system management command.

Syntax

```
CPCSV <file_name>,<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
CPCSV "PMD_Coupler-03",E
```

CPSYSINFO [Copy System Information]

Function

This command copies the system information file from drives E to Z to drive D.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
The copy source system information file should be saved to the following folder of the specified drive.
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\System Information
This message is a system management command.

Syntax

```
CPSYSINFO <file_name>,<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
CPSYSINFO "SystemInfo-20090723_001",E
```

CPXML [Copy XML Data]

Function

This command copies the XML file from drives E to Z to drive D.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
The copy source XML file should be saved to the following folder of the specified drive.

x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\ All Trace Data
This message is a system management command.

Syntax

```
CPXML <file_name>,<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
CPXML "Trace-OPT_AMP",E
```

DBA [Memory Data A]
DBB [Memory Data B]
DBC [Memory Data C]
DBD [Memory Data D]
DBE [Memory Data E]
DBF [Memory Data F]
DBG [Memory Data G]
DBH [Memory Data H]
DBI [Memory Data I]
DBJ [Memory Data J]

Function

This command specifies the Response Data in binary format and queries the trace data.

Syntax

```
DBA?
DBB?
DBC?
DBD?
DBE?
DBF?
DBG?
DBH?
DBI?
DBJ?
```

Response Data

<binary_data>

Data formation: Double Precision Floating Point

Linear scale absolute value display	0.1000E – 8 to 1.0000E + 3	Unit mW
Linear scale relative value display	0.1000E – 3 to 1.0000E + 3	Unit %
Log scale absolute value display	–120.00 to 30.00	Unit dBm
Log scale relative value display	–100.00 to 100.00	Unit dB

The binary data is the character after the number sign (#) indicating the number of digits in the data.

The binary data follows the number indicating the data length.

Example: `#42002an%*qe4445+\...`

4 digits 2002 bytes of binary data

DCA [Data Condition Trace A]
DCB [Data Condition Trace B]
DCC [Data Condition Trace C]
DCD [Data Condition Trace D]
DCE [Data Condition Trace E]
DCF [Data Condition Trace F]
DCG [Data Condition Trace G]
DCH [Data Condition Trace H]
DCI [Data Condition Trace I]
DCJ [Data Condition Trace J]

Function

This command queries wavelength and sampling points of the trace.

Syntax

```
DCA?
DCB?
DCC?
DCD?
DCE?
DCF?
DCG?
DCH?
DCI?
DCJ?
```

Response Data

```
<numeric_value>,<numeric_value>,<switch>
```

No.	Parameter type	Data range	Description
1	<numeric_value>	600.00 to 1750.00 | –999.99	Start wavelength (nm)
2	<numeric_value>	600.00 to 1800.00 | –999.99	Stop wavelength (nm)
3	<switch>	51 | 101 | 251 | 501 | 1001 | 2001 | 5001 | 10001 | 20001 | 50001 | –999	Sampling points

In following case, response data is "–999.99, –999.99, –999"
Trace type is "Calculate", and parameters of trace to be calculated are not same.

Example of Use

```
DCA?
>1100.00,1800.00,501
DCJ?
>-999.99,-999.99,-999
```

DELCOPYDAT [Delete Image Data]

Function

This command deletes the screen image file saved in the specified device. The extension (bmp or png) of the deleted graphics file is the extension specified at Copy Settings.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
This message is a system management command.

Syntax

```
DELCOPYDAT <file_name>,D|<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
DELCOPYDAT "LED_125M(025)",E
```

DELCSV [Delete CSV Data]

Function

This command deletes the trace CSV file saved in the specified device.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
This message is a system management command.

Syntax

```
DELCSV <file_name>, D|<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
DELCSV "PMD_Coupler-03",E
```

DELM [Delimiter]

Function

This command sets and queries the remote control terminator.
This message is a system management command.

Syntax

```
DELM 0|1|2
DELM?
```

0: Sets remote control terminator to Line Feed (LF)
1: Sets remote control terminator to Carriage Return and Line Feed (CR/LF)
2: Sets remote control terminator to None (None EOI only) and uses EOI only

Response Data

```
0|1|2
```

This is the same processing as message TRM.

DELSYSINFO [Delete System Information]

Function

This command deletes the system information file saved in the specified device.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
This message is a system management command.

Syntax

```
DELSYSINFO <file_name>, D|<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
DELSYSINFO "SystemInfo-20090723_003",D
```

DELXML [Delete XML Data]

Function

This command deletes the trace XML file saved in the specified device.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
This message is a system management command.

Syntax

```
DELXML <file_name>, D|<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
DELXML "PMD_Coupler-03",E
```

DMA [Memory Data A]
DMB [Memory Data B]
DMC [Memory Data C]
DMD [Memory Data D]
DME [Memory Data E]
DMF [Memory Data F]
DMG [Memory Data G]
DMH [Memory Data H]
DMI [Memory Data I]
DMJ [Memory Data J]

Function

This command specifies the response data numeric format and queries the trace data sampling points, which is displayed on the screen. Data is output with the following string separators.
Communication I/F terminator LF or NONE: LF (Line Feed)

Communication I/F terminator CR/LF or NONE:
CR (Carriage Return) + LF (Line Feed)

Syntax

```
DMA?
DMB?
DMC?
DMD?
DME?
DMF?
DMG?
DMH?
DMI?
DMJ?
```

Response Data

<numeric_value>

Linear scale absolute value display	0.1000E – 8 to 1.0000E + 3	Unit mW
Linear scale relative value display	0.1000E – 3 to 1.0000E + 3	Unit %
Log scale absolute value display	–120.00 to 30.00	Unit dBm
Log scale relative value display	–100.00 to 100.00	Unit dB

Example of Use

```
DMA?
>-83.23
DMB?
>0.362E-3
```

DMK [ΔMarker]

Function

This command displays the delta marker and sets its wavelength.
This command queries the difference in wavelength and level between the delta and trace markers.

Syntax

```
DMK <numeric_value>
DMK?
```

`<numeric_value>`: Wavelength or frequency difference (nm/THz) Rounded to 4 decimal places at wavelength marker display and to 5 places at frequency display. The range is between the start and stop wavelengths.

Response Data

```
DMK <numeric_value>,<numeric_value>
```

`<numeric_value>`:

No.	Parameter type	Description
1	<numeric_value>	Wavelength difference between delta and trace markers (nm)
2	<numeric_value>	Level differences between delta and trace markers (dB)

DPS [Dip Search]

Function

This command detects the spectrum level dip point and moves the trace marker to that point. The level dip point detection method is queried. When processing is completed, bit 0 of the end event status register (ESR2) is set to 1.

Syntax

```
DPS <switch>
DPS?

<switch>=DIP|LAST|LEFT|NEXT|RIGHT
```

DIP: Detects minimum level point and moves trace marker to point

LAST: Detects next lowest dip point after current point and moves trace marker to point

LEFT: Detects next dip point on the left after current point and moves trace marker to point

NEXT: Detects next highest dip point after current point and moves trace marker to point

RIGHT: Detects next dip point on the right after current point and moves trace marker to point

Response Data

```
<switch>|ERR
```

ERR: The dip point detection results are not displayed.
Use TMK? to query the dip point wavelength and level.

DQA [Memory Data A]
DQB [Memory Data B]
DQC [Memory Data C]
DQD [Memory Data D]
DQE [Memory Data E]
DQF [Memory Data F]
DQG [Memory Data G]
DQH [Memory Data H]
DQI [Memory Data I]
DQJ [Memory Data J]

Function

This command specifies the numeric format of the response data and queries the sampling count for trace A to J data. The data are output with comma separators.

Syntax

```
DQA?
DQB?
DQC?
DQD?
DQE?
DQF?
DQG?
DQH?
DQI?
DQJ?
```

Response Data

<numeric_value>,<numeric_value>,<numeric_value>,…
Sampling count <numeric_value>

Linear scale absolute value display	0.1000E – 8 to 1.0000E + 3	Unit mW
Linear scale relative value display	0.1000E – 3 to 1.0000E + 3	Unit %
Log scale absolute value display	–120.00 to 30.00	Unit dBm
Log scale relative value display	–100.00 to 100.00	Unit dB

Example of Use

```
DQA?
>-83.23,-83.15,-83.05,-81.55,-80.32,…
DQB?
>0.362E-3,0.389E-3,0.401E-3,0.48E-3,…
```

DRG [Dynamic Range Mode]

Function

This command sets and queries the dynamic range High/Normal.

Syntax

```
DRG HIGH|NORMAL
DRG?
```

Response Data

```
HIGH|NORMAL
```

HIGH:	High dynamic range mode
NORMAL:	Normal dynamic range mode

DSP [Display Mode]

Function

This command sets and queries the level display to the absolute or relative values.

Syntax

```
DSP NRM|NRMZ
DSP?
```

Response Data

```
NRM|NRMZ
```

NRM:	Absolute value display (Normal)
NRMZ:	Relative value display (Normalize)

EMK [Erase Marker]

Function

This command erases display of the wavelength, level, trace and delta markers.

Syntax

```
EMK
```

EOV [Erase Overlap]

Function

This command erases the overlap display of the specified traces.

Syntax

```
EOV <trace>
```

ERR [Error]

Function

This command queries the message code described in Appendix B.
The message code is a value other than under the following conditions:

- Command error bit (bit 5) of standard event status register is 1
- Execution error bit (bit 4) is 1
- Equipment-dependent error bit (bit 3) is 1.

Syntax

```
ERR?
```

Response Data

```
<numeric_value>
```

`<numeric_value>`: Message code

ESE2 [Extended Event Status Enable Register2]

Function

This command sets and queries the enable register value of the end event status register.

Syntax

```
ESE2 <numeric_value>
ESE2?
```

Response Data

```
<numeric_value>
```

`<numeric_value>`: Enable register value 0 to 255

ESE3 [Extended Event Status Enable Register3]

Function

This command sets and queries the enable register value of the error event status register.

Syntax

```
ESE3 <numeric_value>
ESE3?
```

Response Data

```
<numeric_value>
```

`<numeric_value>`: Enable register value 0 to 255

ESR2 [Extended Event Status Enable Register2]

Function

This command queries the end event status register value.

Syntax

```
ESR2?
```

Response Data

```
<numeric_value>
```

`<numeric_value>:` End event register value 0 to 255

ESR3 [Extended Event Status Enable Register3]

Function

This command queries the error event status register value.

Syntax

```
ESR3?
```

Response Data

```
<numeric_value>
```

`<numeric_value>:` Error event status register 0 to 255

FML [Formula]

Function

This command sets the calculation formula for the active trace whose trace type is CALC.
This command queries the calculation formula for the active trace whose trace type is CALC.

Syntax

```
FML <trace>,<trace>,-,<trace>
FML? <trace>
```

Command parameter

First:	Trace with set calculation
Second:	Calculated trace
Third:	Negative operator (–)
Fourth:	Calculating

Query parameter
Trace with query calculation

Response Data

```
<trace>,<trace>,-,<trace>
```

Example of Use

```
FML C,A,-,B
FML? C
>C,A,-,B
```

Set the first parameter of the active trace with the Calculate trace type.

When setting three traces, set different traces. The following setting causes an error.

```
FML A,A,-,B
```

Set traces with the Write or Fix trace type for traces set at the second or fourth command parameter.
Setting a trace with the Calculate trace type causes the error.

GHC [Get Binary Data of Image Data]

Function

This command reads the graphics file in binary format.
The command target is a file in the following folder.
\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Trace Data\Screenshot
The size of the binary data is about 1.4 MB for bmp files and 46 KB for png files.

Syntax

```
GHC? <file_name_ext>,D|<user_drive>
```

`<file_name_ext>`
File name including extension
Example:"Spectrum-Peak.png","Sample-23.bmp"

Response Data

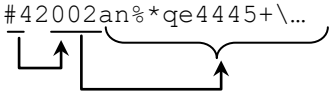
```
<binary_data>
```

Example of Use

```
GHC? "Sample-23.bmp",D
>#541056Avdl-*;E4"as…
```

The binary data is the character after the number sign (#) indicating the number of digits in the data.
The binary data follows the number indicating the data length.

Example: `#42002an%*qe4445+\…`



4 digits 2002 bytes of binary data

ITM [Interval Time]

Function

This command sets and queries the time interval of the sweep start.

Syntax

```
ITM <numeric_value>[SEC]
ITM?
```

<numeric_value>: time interval (s) 0 to 5940
Set numeric values.

Response Data

<time_value>SEC

Example of Use

```
ITM 30 SEC
ITM?
>ITM 30SEC

ITM 20
ITM?
>ITM 20SEC
```

LISTCOPYDAT [List Image Data]

Function

This command queries the image file list saved in the specified device.
The extension (bmp or png) of the search target graphics file is specified at Copy Settings.
Files are arranged in alphabetic order and up to 1000 files can be read.
Graphics files in the following folder of the specified device are output as a list.
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Screenshot
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
This message is a system management command.

Syntax

```
LISTCOPYDAT? D|<user_drive>
```

Response Data

```
<numeric_value>[,<file_name>,<file_name>,<file_name>,…]
```

No.	Parameter type	Description
1	<numeric_value>	Number of files: 0 to 1000
2	<numeric_value>	File name without extension (No. of files)

Example of Use

```
LISTCOPYDAT? D
>3,Copy_000,Copy_001,Copy_002
```

LISTCSV [List CSV Data]

Function

This command queries the CSV file list saved in the specified device. Files are arranged in alphabetic order and up to 1000 files can be read. CSV files in the following folder of the specified device are output as a list.

x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\CSV Data

If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
This message is a system management command.

Syntax

```
LISTCSV? D|<user_drive>
```

Response Data

```
<numeric_value>[,<file_name>,<file_name>,<file_name>,…]
```

No.	Parameter type	Description
1	<numeric_value>	Number of files:0 to 1000
2	<numeric_value>	File name without extension (No. of files)

Example of Use

```
LISTCSV? D
>3,Trce_000,Trce_001,Trce_002
```

LISTSYSINFO [List System Information]

Function

This command queries the system information file list saved in the specified device.
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\System Information
Files are arranged in alphabetic order and up to 1000 files can be read.
System information files in the following folder of the specified device are output as a list.

If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
This message is a system management command.

Syntax

```
LISTSYSINFO? D|<user_drive>
```

Response Data

```
<numeric_value>[,<file_name>,<file_name>,<file_name>,…]
```

No.	Parameter type	Description
1	<numeric_value>	Number of files:0 to 1000
2	<numeric_value>	File name without extension (No. of files)

Example of Use

```
LISTSYSINFO? D
>5,Sys_000,Sys_001,Sys_002,Sys_003,Sys_004
```

LISTXML [List XML Data]

Function

This command queries the XML file list saved in the specified device.
Files are arranged in alphabetic order and up to 1000 files can be read.
XML files in the following folder of the specified device are output as a list.
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Trace Data
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
This message is a system management command.

Syntax

```
LISTXML D|<user_drive>
```

Response Data

```
<numeric_value>[,<file_name>,<file_name>,<file_name>,…]
```

No.	Parameter type	Description
1	<numeric_value>	Number of files:0 to 1000
2	<numeric_value>	File name without extension (No. of files)

Example of Use

```
LISTXML? D
>0
```

LLV [Linear Scale]

Function

The command sets the level scale to the linear and sets the Linear Level value.
The command queries the Linear Level value.

Syntax

```
LLV <numeric_value> [MW|NW|PW|UW|W|PCT]
LLV?
```

<numeric_value>:

- The units for absolute value display are from 1 pW to 1 W as follows: MW:mW, UW: μW, NW:nW, PW:pW,W:W
  If the units are omitted, mW is assumed.
  The numeric value is set in the range 0.1 to 999.9.
- The units for relative value display are from 1 to 1 200 by PCT (%) unit follows:
  The unit can be omitted.

Response Data

```
<numeric_value> MW|NW|PW|UW|W|PCT
```

Example of Use

```
LLV 25.6UW
LLV 50PCT
LLV?
>50PCT
```

LOFS [Level Offset]

Function

This command sets the level offset and moves the screen waveform by the level offset amount.
This command queries the level offset.

Syntax

```
LOFS <numeric_value>
LOFS?
```

Response Data

```
<numeric_value>
```

<numeric_value>: Level offset value (dB) –30.00 to 30.00

Example of Use

```
LOFS -0.2
LOFS?
>-0.2
```

LOG [Log Scale]

Function

This command sets the level scale to Log and scale division (dB/div)
This command queries the Log scale.

Syntax

```
LOG <numeric_value>
LOG?
```

Response Data

```
<numeric_value>
```

<numeric_value>: Log scale value (dB) 0.1 to 10.0

Example of Use

```
LOG 1.5
LOG?
>1.5
```

LVS [Level Scale]

Function

This command queries whether the level scale is set to Log or Linear.

Syntax

```
LVS?
```

Response Data

```
LVS LIN|LOG
```

LIN:	Linear scale
LOG:	Log scale

MDM [Modulation Mode]

Function

This command sets and queries the trigger of the modulation measurement mode.

Syntax

```
MDM NORMAL|TRIGGER
MDM?
```

NORMAL:	Does not use external trigger.
TRIGGER:	Uses external trigger.

Response Data

```
MDM NORMAL|TRIGGER
```

MKA [Wavelength Marker A]

Function

This command sets and displays the value of wavelength marker A. Also, this queries the value of wavelength marker A.

Syntax

```
MKA <numeric_value>
MKA?
```

Response Data

```
<numeric_value>
```

`<numeric_value>:` Wavelength marker value (nm/THz)
Rounded to 4 decimal places at wavelength marker display and to 5 places at frequency display. The range is between the start and stop wavelengths.

Example of Use

```
MKA 632.82
MKA?
>632.8200
```

MKB [Wavelength Marker B]

Function

This command sets and displays the value of the wavelength marker B. Also, this queries the value of the wavelength marker B.

Syntax

```
MKB <numeric_value>
MKB?
```

Response Data

```
<numeric_value>
```

`<numeric_value>:` Wavelength marker value (nm/THz)
Rounded to 4 decimal places at wavelength marker display and to 5 places at frequency display. The range is between the start and stop wavelengths.

MKC [Level Marker C]

Function

This command sets and displays the value of the level marker C.
Also, this queries the level marker C.

Syntax

```
MKC <numeric_value> {DB|DBM|MW|NW|PW|UW|W|PCT}

MKC?
```

<numeric_value>:
The units for absolute value display are as follows:
DBM: dBm, MW: mW, UW: μW, NW: nW, PW: pW,W: W
The units for relative value display are as follows:
Set from 1% to 200% for DB: dB, PCT: %.

Data range:

–190.000 to +50.000:	LOG scale, Absolute value display (dBm)
–160.000 to +160.000:	LOG scale, not normalized relative value display (dB)
–200.000 to +120.000:	Linear scale, not normalized relative value display (dB)
0.001 pW to 1.200 W:	Linear scale, Absolute value display
0 to 240 %:	Linear scale, relative value display

Response Data

```
<numeric_value>{DB|DBM|MW|NW|PW|UW|W|PCT}
```

Example of Use

```
MKC -20.55DBM
MKC?
>-20.550DBM
```

MKD [Level Marker D]

Function

This command sets and displays the value of the level marker D.
Also, this queries the level marker D.

Syntax

```
MKD <numeric_value>{DB|DBM|MW|NW|PW|UW|W|PCT}
MKD?
```

<numeric_value>: Log scale down to 3 decimal points; Linear scale up to 7 digits

The units for absolute value display are as follows:
DBM: dBm, MW: mW, UW: μW, NW: nW, PW: pW,W: W
The units for relative value display are as follows:
Set from 1 to 200% for DB: dB, PCT: %.

Data range:

–190.000 to +50.000:	LOG scale, Absolute value display (dBm)
–160.000 to +160.000:	LOG scale, not normalized relative value display (dB)
–200.000 to +120.000:	Linear scale, not normalized relative value display (dB)
0.0000 pW to 1.2000 W:	Linear scale, Absolute value display
0 to 240%:	Linear scale, relative value display

Response Data

```
<numeric_value> {DB|DBM|MW|NW|PW|UW|W|PCT}
```

MKV [Marker Value Wavelength/Frequency Select]

Function

This command sets the maker display to either wavelength or frequency.
Also, this queries whether the maker display is set to wavelength or frequency.

Syntax

```
MKV FREQ|WL
MKV?
```

FREQ:	Frequency
WL:	Wavelength

Response Data

```
FREQ|WL
```

MMM [Multimode fiber Mode]

Function

This command sets and queries the multimode fiber mode.

Syntax

```
MMM OFF|ON
MMM?
```

Response Data

```
OFF|ON
```

OFF:	Releases multimode fiber mode
ON:	Sets multimode fiber mode

MOD [Measure Mode]

Function

This command queries the measurement mode.

Syntax

```
MOD?
```

Response Data

```
0|1|2|3
```

0: Spectrum not measured
1: Measuring spectrum (single sweep)
2: Measuring spectrum (repeat sweep)
3: Power meter

MPT [Sampling Points]

Function

This command sets and queries the number of the sampling point.

Syntax

```
MPT 51|101|251|501|1001|2001|5001|10001|20001|50001
MPT?
```

Response Data

```
51|101|251|501|1001|2001|5001|10001|20001|50001
```

MVCOPYDAT [Move Image Data]

Function

This command moves the screen image files from drives E to Z to internal hard disk.
The extension (bmp or png) of the moved file is specified at Copy Settings.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.

The graphics file should be moved to the following folder of the specified drive.

x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Screenshot
This message is a system management command.

Syntax

```
MVCOPYDAT <file_name>,<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
MVCOPYDAT "LED_125M(025)",F
```

MVCSV [Move CSV Data]

Function

This command moves the trace CSV file from drives E to Z to drive D.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
The copy source CSV file should be moved to the following folder of the specified drive.

x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\CSV Data
This message is a system management command.

Syntax

```
MVCSV <file_name>,<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
MVCSV "PMD_Coupler-03",F
```

MVSYSINFO [Move System Information]

Function

This command moves the system information file from drive D to drives E to Z.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
The system information file should be moved to the following folder of the specified drive.

x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\System Information
This message is a system management command.

Syntax

```
MVSYSINFO <file_name>,<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
MVSYSINFO "SystemInfo-20090723_001",F
```

MVXML [Move XML Data]

Function

This command moves the trace XML file from drive D to drives E to Z.

If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
The XML file should be moved to the following folder of the specified drive.
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Trace Data
This message is a system management command.

Syntax

```
MVXML <file_name>,<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
MVXML "Trace-OPT_AMP",F
```

OPT [Light Output]

Function

This command sets output of the light source option.
This command queries the output setting of the light source option.

Syntax

```
OPT OFF|ON
OPT?
```

OFF: Obstructs light output
ON: Outputs light

Response Data

```
OFF|ON
```

PKC [Peak→Center]

Function

This command sets the peak wavelength of spectrum to the center wavelength.

Syntax

```
PKC
```

PKL [Peak→Level]

Function

This command sets the peak level of spectrum to the reference level.

Syntax

```
PKL
```

PKS [Peak Search]

Function

This command detects the spectrum peak level point and moves the trace marker to it.
The peak level detection method is queried.
When processing is completed, bit 0 of the end event status register (ESR2) is set to 1.

Syntax

```
PKS <switch>
PKS?

<switch>=LAST|LEFT|NEXT|PEAK|RIGHT
```

LAST: Detects next highest peak level after current point and moves traces marker to that point
LEFT: Detects next peak on the left after current point and moves traces marker to that point
NEXT: Detects next shortest peak level after current point and moves traces marker to that point
PEAK: Detects point with highest level and moves trace marker to that point
RIGHT: Detects next peak on the right after current point and moves trace marker to that point

Response Data

```
<switch>|ERR
```

ERR: The peak level detection (search) results are not displayed.
Use the TMK? to query the peak wavelength and level.

PMOD [Format of Image File]

Function

This command sets the file extension for the graphics data saved by **Copy**.
The command queries the graphics data file extension.

Syntax

```
PMOD [BMP|PNG]
PMOD?
```

BMP: bmp format
PNG: png format
When omitted: bmp format

Response Data

```
BMP|PNG
```

PPC [Peak to Peak Calculation]

Function

This command sets the Peak to Peak display setting of trace.
This command queries the Peak to Peak display setting of trace.

Syntax

```
PPC OFF|ON
PPC?
```

OFF: Displays Peak to Peak.
ON: Does not display Peak to Peak.

Response Data

```
OFF|ON
```

PPMK [Peak to Peak Maker]

Function

This command queries the Peak to Peak display result of trace.

Syntax

```
PPMK?
```

Response Data

```
<numeric_value>
```

`<numeric_value>`: Peak to Peak measurement result (dB/W)

When Peak to Peak Calculation is NOT set to On, the response data for PPMK? command is –999.99.

PRE [Preset]

Function

This command initializes the measurement parameter.
As for the initialized parameters and default values, refer to Appendix B, "Initial Values" in the *MS9740A Optical Spectrum Analyzer Operation Manual*.

Syntax

```
PRE
```

PRINT [Save Image Data]

Function

This command saves the screen image files.
The name of the file to be saved and the save destination device can be specified. However, the file extension (bmp or png) is specified in Copy Settings.

When omitted, the file is automatically named in the following format: "Copydate_Sequential number.bmp". Here, a number from 000 to 999 is sequentially affixed to the name.
Since the file number returns to 000 after 999, files with the same name are overwritten.
Files are saved to the following directory in the specified drive.
\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Screenshot
Up to 1000 files can be saved in the folder.

Syntax

```
PRINT [<file_name>]|[D|<user_drive>]|
       [<file_name>,D|<user_drive>]
```

When <file_name> omitted, the file is automatically named in the following format: "Copydate_Sequential number.bmp".
When D|<user_drive> omitted, the drive is D.
It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
PRINT "TEST",D
```

PRTCOPYDAT [Protect Image Data]

Function

This command prohibits deletion of screen image files saved in the specified device.
The extension (bmp or png) of the target graphics file is the extension specified at Copy Settings.
When an error occurs because the specified device or file is not found, the execution error bit of the standard event status register is set to 1.
The screen image files in the following folder of the specified device can be set to "write protect".
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Screenshot
This message is a system management command.

Syntax

```
PRTCOPYDAT <file_name>,OFF|ON,D|<user_drive>
PRTCOPYDAT? <file_name>,D|<user_drive>
```

OFF: Permits deletion
ON: Prohibits deletion

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Response Data

```
OFF|ON
```

Example of Use

```
PRTCOPYDAT "LED_125M(025)",ON,E
PRTCOPYDAT? "LED_125M(025)",E
>ON
```

PRTCSV [Protect CSV Data]

Function

This command prohibits deletion of CSV files saved in the specified device.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
CSV files in the following folder of the specified device can be set to write protect.

x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\CSV Data
This message is a system management command.

Syntax

```
PRTCSV <file_name>,OFF|ON,<user_drive>
PRTCSV? <file_name>,<user_drive>
```

OFF: Permits deletion
ON: Prohibits deletion
It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
PRTCSV "PMD_Coupler-03",OFF,E
PRTCSV? "PMD_Coupler-03",E
>OFF
```

PRTSYSINFO [Protect System Information]

Function

This command prohibits deletion of system information files saved at the specified device.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
The system information files in the following folder of the specified device can be set to write protect.

x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\System Information
This message is a system management command.

Syntax

```
PRTSYSINFO <file_name>,OFF|ON,<user_drive>
PRTSYSINFO? <file_name>,<user_drive>
```

OFF: Permits deletion
ON: Prohibits deletion
It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
PRTSYSINFO "SystemInfo-20090723_001",ON,E
PRTSYSINFO? "SystemInfo-20090723_001",E
>ON
```

PRTXML [Protect XML Data]

Function

This command prohibits deletion of XML files saved in the specified device.

If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
XML files in the following folder of the specified device can be set to "write protect".

x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Trace Data
This message is a system management command.

Syntax

```
PRTXML <file_name>,OFF|ON,<user_drive>
PRTXML? <file_name>,<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
PRTXML "Trace-OPT_AMP",OFF,E
PRTXML? "Trace-OPT_AMP",E
>OFF
```

PWR [Power Monitor]

Function

This command sets and queries the power monitor wavelength.
When processing is completed, bit 3 of the end event status register (ESR2) is set to 1.

Syntax

```
PWR 632.8|850|1300|1550
PWR?
```

Response Data

```
632.8|850|1300|1550
```

PWRR [Power Monitor Result]

Function

This command queries the measurement results of the power monitor.

Syntax

```
PWRR?
```

Response Data

```
<numeric_value>
```

`<numeric_value>`: Power monitor measurement results (dBm)

When sending `PWRR?` without setting to power monitor, `***` is queried as response data.

RCAL [Resolution Calibration]

Function

This command sets the actual resolution value to the initial value or correction value.
The actual resolution calibration status is queried.
When processing is completed, bit 4 of the end event status register (ESR2) is set to 1.

Syntax

```
RCAL 0|1
RCAL?
```

0: Uses default resolution calibration value
1: Executes resolution calibration and calculates resolution calibration value

Response Data

```
0|1|2|3
```

0: Uses default resolution calibration value
1: Resolution calibration finished normally
2: Calibrating resolution
3: Resolution calibration finished abnormally

RCXML [Recall XML Data]

Function

This command reads the parameters and data for 10 traces from the XML file saved in the specified device.
If the specified device or file cannot be found and an error is generated, the standard event status execution error bit becomes 1.
The XML files in the following folder of the specified device can be read.

x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\Trace Data

Syntax

```
RCXML <file_name>,D|<user_drive>
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
RCXML "Trace-OPT_AMP",F
```

RES [Resolution]

Function

This command sets the resolution.
This command queries the set resolution.

Syntax

```
RES 0.03|0.05|0.07|0.1|0.2|0.5|1.0
RES?
```

Response Data

```
0.03|0.05|0.07|0.1|0.2|0.5|1.0
```

RLV [Reference Level]

Function

At the time of setting the Log scale, this command sets and queries the reference level.

Syntax

```
RLV <numeric_value>
RLV?
```

Response Data

```
<numeric_value>
```

At absolute value display: Reference level (dBm) –90.0 to 30.0
At relative value display: Reference level (dB) –100.0 to 100.0

SMD [Storage Mode]

Function

This command sets and queries the Storage Mode of trace.

Syntax

```
SMD <trace>,AVS|MAX|MIN|OFF|OVL
SMD? <trace>
```

Response Data

```
<trace>,AVS|MAX|MIN|OFF|OVL
```

AVS:	Calculates and displays mean for totals from waveform memory values and measured values
MAX:	Overwrites and displays just larger values than waveform memory values
MIN:	Overwrites and displays just smaller values than waveform memory values
OFF:	Displays measured data as is
OVL:	Overwrites traces in each sweep.

SMT [Smooth]

Function

This command sets and queries the smoothing point count.

Syntax

```
SMT 3|5|7|9|11|OFF
SMT?
```

Response Data

```
3|5|7|9|11|OFF
```

3, 5, 7, 9, 11: This is the point count for smoothing.
OFF: Smoothing is not performed.

SOFTVER [Software Version]

Function

This command queries the software version.
This message is a system management command.

Syntax

```
SOFTVER? ALL|OSA
```

ALL: Queries all versions of the software installed in the MS9740A.
OSA: Queries the version of software for the Optical Spectrum Analyzer.

Response Data

```
ALL|OSA <string>
```

`<string>`: Character string indicating software version

Example of Use

```
SOFTVER? OSA
>OSA 1.0.0
```

SPC [Spectrum Mode]

Function

This command exits the power monitor measurement.

Syntax

```
SPC
```

SPN [Span Wavelength]

Function

This sets and queries the sweep width (nm).

Syntax

```
SPN <numeric_value>
SPN?
```

Response Data

```
<numeric_value>
```

<numeric_value>: Sweep width (nm) 0|0.2 to 1200.0

STHR [Search Threshold]

Function

This command sets the search threshold for Peak/Dip Search.
This command queries the search threshold for Peak/Dip Search.

Syntax

```
STHR <numeric_value>
STHR?
```

Response Data

<numeric_value>: Search Threshold (dB) 0|0.01 to 10.00

STHRS [Search Threshold Set]

Function

This command sets the search threshold Auto/Manual setting for Peak/Dip Search.
This command queries the search threshold for Peak/Dip Search.

Syntax

```
STHRS AUTO|MANUAL
STHRS?
```

Response Data

```
AUTO|MANUAL
```

AUTO: Sets Search Threshold setting to Auto.
MANUAL: Sets Search Threshold setting to Manual.

SRT [Repeat Sweep]

Function

This command starts the repeat sweeping.

Syntax

```
SRT
```

SSI [Single Sweep]

Function

This command starts the single sweeping.
When sweeping is completed, bit 1 (at sweeping end) of the end event status register (ESR2) is set to 1.

Syntax

```
SSI
```

SST [Sweep Stop]

Function

This command stops the sweeping.

Syntax

```
SST
```

STA [Start Wavelength]

Function

This command sets and queries the start wavelength (nm).

Syntax

```
STA <numeric_value>
STA?
```

Response Data

```
<numeric_value>
```

`<numeric_value>:` Start wavelength (nm) 600.0 to 1750.0
Specify smaller value than Stop wavelength.

STO [Stop Wavelength]

Function

This command sets and queries the stop wavelength (nm).

Syntax

```
STO <numeric_value>
STO?
```

Response Data

```
<numeric_value>
```

<numeric_value>: Stop wavelength (nm) 600.0 to 1800.0
Specify larger value than Start wavelength.

SVCSV [Save CSV Data]

Function

This command saves the trace CSV file in the specified device.
When the file name omitted, the file is automatically named in the following format; "WaveDatadate_Sequential number.csv". Here, a number from 000 to 999 is sequentially affixed to the name.
No more files can be saved if numbers up to 999 are already used.
When the device specification omitted, the file is saved in the D drive.
Files are saved to the following directory in the specified drive.
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\CSV Data
When an error is caused because a specified device is not found, 1 is written to the execution error bit of the standard event status register.

Syntax

```
SVCSV [<file_name>[,D|<user_drive>]]
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
SVCSV
SVCSV "PMD_Coupler-03",E
```

SVCSVA [Save CSV All Data]

Function

This command saves all trace CSV files to the specified device.
The file name created when the file name is omitted will be formatted as "WaveData date_sequential number.csv". The range of the sequential numbers appended to the file name in this case is 000 to 999.
If all the numbers up to 999 have been used, no more files will be saved.
If the device is not specified, files will be saved to drive D.
The files are saved to the following folder on the drive specified.
x:\Anritsu Corporation\Optical Spectrum Analyzer\User Data\CSV Data
If the specified device is not found or another error occurs, the execution error bit for the standard event status becomes 1.

Syntax

```
SVCSVA [<file_name>[,D|<user_drive>]]
```

An extension is not required for the file_name. Enclose file_name in double quotation marks.

Examples of Use:

```
SVCSVA
SVCSVA "PMD_Coupler-03",E
```

SVXML [Save XML Data]

Function

This command saves the trace XML file in the specified device.
When the file name omitted, the file is automatically named in the following format; "WaveDatadata_Sequential number.xml". Here, a number from 000 to 999 is sequentially affixed to the name.
No more files can be saved if numbers up to 999 are already used.
When the device specification omitted, the file is saved in the D drive.
Files are saved to the following directory in the specified drive.
x\Anritsu Corporation\Optical Spectrum Analyzer\User Data\All Trace Data
When an error is caused because a specified device is not found, 1 is written to the execution error bit of the standard event status register.

Syntax

```
SVXML [<file_name>[,D|<user_drive>]]
```

It is not necessary to add the extension to file_name. Remember to enclose the file name in double quotation marks.

Example of Use

```
SVXML "Trace_all"
SVXML "Trace_all",E
```

SYS [Application Switch]

Function

This command switches the Config screen and the Spectrum Measurement screen. It can be switched using a system management command or a measurement command.
This command queries the types of commands that can be used and the screen display.
For the system management and measurement commands, refer to Section 4.3.2 System Management and Measurement Commands.

Syntax

```
SYS CONFIG|OSA[,ACT|INACT|MIN]
SYS? CONFIG|OSA
```

CONFIG: Activates Config screen display and system management command
OSA: Activates measurement screen display and measurement command
ACT: Displays front-most screen and permits operation (active status)
When the Config screen is set to Active, the system management \command is available.
When the measurement screen is set to Active, the measurement command is available.
INACT: Makes screen operations inactive
MIN: Minimizes screen display size
ACT is assumed if the setting is omitted.

Response Data

```
CRRENT|IDLE|RUN|UNLOAD,ACT|INACT|MIN|NON
```

CURRENT:	Executes and makes operation target
IDLE:	Loads but does not execute
RUN:	Executes, but does not make operation target
UNLOAD:	Does not load

ACT	Displays active screen
INACT	Displays not active screen
RUN:	Displays minimized screen
NON:	No display

Example of Use

```
SYS OSA,MIN
SYS? OSA
>CURRENT,MIN
SYS CONFIG,ACT
SYS? OSA
>RUN,INACT
```

SYSINFO [System Information]

Function

This command queries the system information.
This message is a system management command.

Syntax

```
SYSINFO? ALL|MODEL|SERIAL|TYPE
```

ALL:	Queries product name, model name, and serial number.
MODEL:	Queries model name.
SERIAL:	Queries serial number.
TYPE:	Queries product name.

Response Data

```
<string>|<numeric_value>|
<string>,<string>,<numeric_value>
```

<string>:	Character displaying product name model
<numeric_value>:	Integer value indicating serial number

Example of Use

```
SYSINFO? ALL
>Optical Spectrum Analyzer,MS9740A,610000001
SYSINFO? MODEL
>MS9740A
SYSINFO? SERIAL
>610000001
SYSINFO? TYPE
>Optical Spectrum Analyzer
```

TDL [Ext-Trigger Delay Time]

Function

This command sets and queries the delay time (μs) when using the external trigger.

Syntax

```
TDL <numeric_value>
TDL?
```

<numeric_value> numeric value 0 to 5000000

Response Data

```
<numeric_value>
```

<numeric_value>: Group delay time (μs) 0 to 5000000

TER [Title Erase]

Function

This command deletes all characters displayed in the title.

Syntax

```
TER
```

TMD [Trace Display]

Function

This command sets and queries the trace display.

Syntax

```
TMD <trace>,OFF|ON
TMD? <trace>
```

Response Data

```
<trace>,OFF|ON
```

OFF: Displays the specified trace waveform.
ON: Deletes the specified trace waveform.However, nothing is displayed if Trace Type is Blank.

TMK [Trace Marker]

Function

This command sets the wavelength of the trace marker and displays the trace marker.
Furthermore, this queries the wavelength and level of the trace marker.

Syntax

```
TMK <numeric_value>
TMK?
```

<numeric_value>: Wavelength marker value (nm/THz)
Rounded to 4 decimal places at wavelength marker display and to 5 places at frequency display. The range is between the start and stop wavelengths.

Response Data

```
<numeric_value>,<numeric_value>
      DB|DBM|MW|NW|PCT|PW|UW|W
```

No.	Parameter type	Description
1	<numeric_value>	Trace Marker wavelength (nm/THz)
2	<numeric_value>	Trace Marker level (screen display units) Refer to the following for the units.

- The units for absolute display are as follows:
  DBM: dBm, MW: mW, UW: μW, NW: nW, PW: pW, W: W
- The units for relative display are as follows:
  :DB: dB, PCT: %

When analysis is impossible at Linear scale, becomes –1.

TRM [Terminator]

Function

This command sets and queries the remote control terminator.
This message is a system management command.

Syntax

```
TRM 0|1|2|LF|CRLF|NONE
TRM?
```

Response Data

```
0|1|2
```

0|LF:	Sets remote control terminator to Line Feed (LF)
1|CRLF:	Sets remote control terminator to Carriage Return and Line Feed (CR/LF)
2|NONE:	Sets remote control terminator to None and uses only EOI only

This is the same processing as message DELM.

TSL [Trace Select]

Function

This command sets and queries the active trace.

Syntax

```
TSL <trace>
TSL?
```

Response Data

```
<trace>
```

TTL [Title]

Function

This command sets and queries the title.

Syntax

```
TTL <string>
TTL?
```

Response Data

```
TTL <string>
```

<string>: Title string of 32 or less characters

Example of Use

```
TTL "Forward Cur. 50mA,Temp. 23deg."
TTL?
>"Forward Cur. 50mA,Temp. 23deg."
```

TTP [Trace Type]

Function

This command sets and queries the trace type.

Syntax

```
TTP <trace>,BLANK|CALC|FIX|WRITE
TTP? <trace>
```

Response Data

```
<trace>,BLANK|CALC|FIX|WRITE
```

BLANK:	Deletes the data. The data cannot be written.
CALC:	The calculation formula when saving the calculation results between traces can be set using FML.
FIX:	Keeps the data. Even when the measurement is performed, the data cannot be rewritten.
WRITE:	The measured data can be written.

Example of Use

```
TTP C,FIX
TTP? C
>C,FIX
```

VBW [Video Band Width]

Function

This command sets and queries the video band width.

Syntax

```
VBW 10HZ|100HZ|200HZ|1KHZ|2KHZ|10KHZ|100KHZ|1MHZ
|10|100|200|1000|2000|10000|100000|1000000
VBW?
```

Response Data

```
10HZ|100HZ|200HZ|1KHZ|2KHZ|10KHZ|100KHZ|1MHZ
```

Example of Use

```
VBW 1000
VBW?
>1KHZ
```

WCAL [Wavelength Calibration]

Function

This command performs wavelength calibration when using an external light source or reference light source option and creates the wavelength calibration data.
This command queries the wavelength calibration execution result.
When wavelength calibration is completed, 1 is written to bit 4 (execution completion bit) of the end event status register.

Syntax

```
WCAL 0|1|2|3
WCAL?
```

0: Initializes wavelength calibration data
1: Executes wavelength calibration when using external light source and creates wavelength calibration data
2: Executes wavelength calibration when using reference light source and creates wavelength calibration data
3: Stops wavelength calibration and does not create wavelength calibration data

Response Data

```
0|1|2|3
```

0: Ends wavelength calibration
1: Wavelength calibration in progress
2: Terminates wavelength calibration due to lack of optical level
3: Terminates wavelength calibration due to other abnormal phenomena

WDP [Wavelength Display]

Function

This command sets and queries whether to display the wavelength in air or in vacuum.

Syntax

```
WDP AIR|VACUUM
WDP?
```

Response Data

```
AIR|VACUUM
```

AIR: Value in air
VACUUM: Value in vacuum

WOFS [Wavelength Offset]

Function

This command sets and queries the wavelength offset and moves the waveform on the screen by the offset.

Syntax

```
WOFS <numeric_value>
WOFS?
```

Response Data

```
<numeric_value>
```

<numeric_value>: Wavelength offset value (nm) –1.00 to 1.00

Example of Use

```
WOFS -0.05
WOFS?
>-0.05
```

WSS [Wavelength Start and Stop]

Function

This command sets and queries the start and stop wavelength simultaneously.

Syntax

```
WSS <numeric_value>,<numeric_value>
WSS?
```

Response Data

```
<numeric_value>,<numeric_value>
```

No.	Parameter type	Range	Description
1	<numeric_value>	600.0 to 1750.0	Start wavelength (nm)
2	<numeric_value>	600.0 to 1800.0	Stop wavelength (nm)

However, the value of the second parameter is larger than the first parameter.

Example of Use

```
WSS 800,900
WSS?
>800.0,900.0
```

ZCAL [Zero Calibration]

Function

This command executes the calibration function (Zero Calibration). When zero level calibration is completed, bit 4 of end event status register (execution completion bit) is written to 1.
This command queries the actual Zero Calibration status.

Syntax

```
ZCAL 0|1|2
ZCAL?
```

1: Starts Zero Calibration
2: Stops performing Zero Calibration

Response Data

```
0|1|2
```

0: Normal ends Zero Calibration
1: Performing Zero Calibration
2: Abnormal ends Zero Calibration

Example of Use

```
ZCAL 1
ZCAL?
>0
```

Note:

The message to set Auto Cal, explained in Section 3.1.2 Calibrating Wavelength in the MS9740A Optical Spectrum Analyzer Operation Manual, is not available.

In cases where the measurement is performed via remote control, even when Auto Cal is set to On, the Zero Calibration cannot be performed automatically. On the other hand, if ZCAL is sent, Zero Calibration can be performed at the given timing.

ZMK [Zone Marker]

Function

This command sets and queries the value and display of the zone marker. The details of parameters for each zone marker operation are described separately below.

Syntax

```
ZMK <switch>,<parameter>,,
ZMK?
```

Response Data

```
<switch>,<parameter>,,
```

```
<switch>= ERS|SPN|WL|ZOOM
```

The number of <parameter> varies depending on the status of <switch>.

<switch>	Operation Type	Number of <parameter>
ERS	Deletes the zone marker display.	0
SPN	Sets the wavelength wide of the zone marker to the sweep width.	0
WL	Sets the center wavelength of the zone marker to the wavelength width.	2
ZOOM	Sets the zone marker display magnification range.	1

ZMK ERS[Zone Marker (Erase)]

Function

This command erases the zone marker display.

Syntax

```
ZMK ERS
```

Example of Use

```
ZMK ERS
```

ZMK SPN[Zone Marker (Span)]

Function

This command sets the wavelength width of the zone marker to the sweep width.

Syntax

```
ZMK SPN
```

Example of Use

```
ZMK SPN
```

ZMK WL[Zone Marker (Wavelength)]

Function

This command sets and queries the center wavelength of the zone marker and wavelength width.

Syntax

```
ZMK WL,<numeric_value>,<numeric_value>
ZMK? WL
```

Response Data

```
WL,<numeric_value>,<numeric_value>
```

No.	Parameter type	Range	Description
1	<numeric_value>	Larger than Start wavelength and smaller than Stop wavelength	Zone Marker center wavelength (nm)
2	<numeric_value>	0.2 or more	Zone Marker wavelength width (nm)

Set the Zone market range so that is bigger than the Start wavelength but does not exceed the Stop wavelength. The narrowest range is 0.2 nm.

Example of Use

```
ZMK WL,1525,2.5
ZMK? WL
>WL,1525,2.5
```

ZMK ZOOM [Zone Marker(Zoom In/Out)]

Function

This command sets and queries the Zone Marker zoom in and zoom out range.

Syntax

```
ZMK ZOOM,{IN|OUT}
ZMK? ZOOM
```

Response Data

```
ZOOM,{IN|OUT}
```

IN:	Zooms in on Zone Marker range
OUT:	Analyzes zoomed in Zone Marker range

Example of Use

```
ZMK ZOOM,IN
ZMK ZOOM?
>ZOOM,IN
```

Appendix A Changes from MS9710C

This appendix explains the changed items from the MS9710C Optical Spectrum Analyzer.

Table A-1 Removed MS9710C Commands

Removed MS9710C Commands	Equivalent MS9740A Command
BKL	None
CPY	None
CRCL	None
CSAV	None
DATE	None
DEL	DELCOPYDAT (Deleting image file) DELSYSINFO (Deleting system information) DELCSV (Deleting CSV file) DELXML (Deleting XML file)
DMD	DSP
FED	None
FMT	None
FOPT	None
GCL	None
HEAD	None
LCD	None
MSL	TTP
RCL	RCXML
SAV	SVXML
TDSP	None
TIME	None
TLSA	None
TLST	None
TMC	None

Table A-2 Changes from MS9710C Command Specifications

Changed Commands	MS9710C Specifications	MS9740A Specifications
ANAR?	(RMS measurement) λc,Δλ	(RMS measurement) λc,Δλ,σ σ: Standard deviation
AP	AP DFB,s,n	AP DFB,s,n,k s = 2NDPEAK| LEFT|RIGHT n = 0.1 to 50.0 k = 1.00 to 10.00
	AP LED,n,p	AP LED,n,p,k n = 0.1 to 50.0 p = –10.0 to +10.0 k = 1.00 to 10.00
	AP PMD,n	AP PMD,n,m[,p] n = 0.01 to 1.00 m= 0|1 p = 2 to 99
	AP AMP,MSL,s s = PIN|POUT	AP AMP,MSL,s s = PIN|POUT| PASE
	AP? AMP,CAL 0: Normal end of calibration for resolution 1: Lack of optical level 2: Other failures	AP? AMP,CAL 0: Uses initial valuefor the configuration value of the actual resolution 1: Normal end of calibration for resolution 2: Calibrating resolution in progress 3: Abnormal end of calibration for resolution
	AP WDM,SLV,n n = 1 to 50	AP WDM,SLV,n n = 0.1 to 50

Table A-2 Changes from MS9710C Command Specifications (Cont'd)

Changed Commands	MS9710C Specifications	MS9740A Specifications
APR?	(DFB-LD application) SMSR,BWndb,λp,Lp,λsm, Lsm,MOFS,STBW,CNTOFS	(DFB-LD application) SMSR,kσ,Δλp,Lp,λsm,Ls m,MOFS,STBW,CNTOFS,σ kσ:Spectrum Bandwidth using RMS method σ: Standard deviation
	(FP-LD application) FWHM,λm,λp,Lp, MODE,MSPC,POW	(FP-LD application) FWHM,λm,λp,Lp, MODE,MSPC,POW,σ σ: Standard deviation
	(LED application) λfwhm,λndb,FWHM,BWndb ,λp,Lp,PKdens,POW	(LED application) λfwhm,λndb,FWHM,BWndb ,λp,Lp,PKdens,POW,σ σ: Standard deviation
AVS	AVS n n = 2 to 1000 | OFF	AVS n (n = 1 to 1000) 1 is set at OFF.

Table A-2 Changes from MS9710C Command Specifications (Cont'd)

Changed Commands	MS9710C Specifications	MS9740A Specifications
DBA? DBB?	At log scale Signed 16 bit integer value Measured value: 0.01 dBm represented as 1 At linear scale Exponent: 16 bits Mantissa: signed 16 bits Measured value: (mantissa × 0.0001)E+ (exponent) mW The minimum value at linear scale measurement is 1E–12 (0.001 pW).	At log scale 64 bit double precision floating point (Double) Measured value: 1 dBm represented as 1 At linear scale 64 bit double precision floating point (Double) Measured value: 1 mW represented as 1 When using the linear scale, sometimes the measured value may be negative. Offset calibration sets the measured average noise level to 0, resulting in a negative value if the output noise level drops below the average level.
DMA? DMB? DQA? DQB?	The minimum value at linear scale measurement is 1E–12 (0.001 pW).	When using the linear scale, sometimes the measured value may be negative. Offset calibration sets the measured average noise level to 0, resulting in a negative value if the output noise level drops below the average level.
MPT	MPT n n = 51|101|251|501|1001|2001|5001	MPT n n = 51|101|251|501|1001|2001|5001|10001|20001|50001
RES	RES n n = 0.05|0.07|0.1|0.2|0.5|1	RES n n = 0.03|0.05|0.07|0.1|0.2|0.5|1.0
TSL	TSL s s = A|B|AB|A_B|B_A	TSL s s = A|B|C|E|F|G|H|I|J

Appendix B Message Codes

This appendix explains the meaning of the ERR? message response number (code).

(1) Error Code [–100 to –199]

The error code [–100 to –199] indicates that the IEEE488.2 syntax error occurs. When the error occurs, bit 5 of the event status register is set.

Table B-1 Syntax Error Code (–100 to –199)

Code	Meaning
–108 –109	Incorrect parameter count
–113	Command header undefined
–113	Undefined error.
–120	Incorrect numeric data.
–140	Character data error
–140	Illegal character in input string
–150	Incorrect string data.
–160	Block data error

(2) Execution error [–200 to –299]

The error code [–200 to –299] indicates that an error occurs in the controlled part of the device. When the error occurs, bit 4 of the event status register is set.

Table B-2 Execution Error Code

Code	Meaning
–200	Execution error
–221	Setting conflict.
–220	Other error.
–222	Input value out of range.
–222	Character string too long.
–250	File read failed.
–250	File read failed (incorrect model).
–250	File read failed (incorrect option configuration).
–250	File write failed.
–250	Folder not found.
–250	Input title.
–250	Item not selected.
–250	Mass storage error
–250	No file selected.
–250	Either the device has insufficient free space or the 1000 limit on saved files has been reached.
–250	Specified file already exists.
–250	Save file name not specified.
–252	No external storage device
–254	Target device full.
–256	File not found.
–258	Operation failed because write protected.

(3) Device-dependent error [–300 to 399], [0 to 32767]

The error code [–300 to 399] and [0 to 32767] indicates that errors other than command and execution errors occur in the device. When the device error occurs, bit 3 of the event status register is set.

Table B-3 Device dependant Error Code (0 to 99)

Code	Meaning
0	No error.
1	Optical Unit failed memory test at boot.
2	Slit 1 error in Optical Unit.
3	Slit 2 error in Optical Unit.
4	Optical Unit failed alignment adjustment.
5	Optical attenuator error.
7	Optional light source error.
8	Optical Unit failed grating control.
9	Optical Unit failed offset adjustment.
10	Optical input power is too high. Insert attenuator or decrease input level.
11	Optical Unit failed program test. Contact Anritsu or representative.
12	Optical Unit failed calibration data test Contact Anritsu or representative.
13	Optical Unit failed FPGA data test. Contact Anritsu or representative.
14	Error in Optical Unit.
49	Control CPU application error. File not found.
51	Control CPU Boot Error.
52	FPGA Config Error.
53	Control CPU Shutdown Error.

Table B-4 Measurement Code (100 to 199)

Code	Meaning
100	Auto Measure finished unsuccessfully.
101	Peak point not found. Confirm that optical level is high enough for Peak Search.
102	Dip point not found. Confirm that optical level is high enough for Dip Search.
110	Optical power too low to calibrate wavelength. Adjust input level.
111	Wavelength calibration failed.
112	Optical power too low for Optical Unit auto-adjustment. Adjust input level.
113	Optical Unit failed auto alignment.
114	Resolution bandwidth calibration failed.
115	Auto CAL failed.

Table B-5 Operation Code (200 to 299)

Code	Meaning
210	Operation prohibited during measurement.
211	Operation prohibited during Auto Measure.
212	Operation prohibited while Power Monitor is displayed.
213	Operation prohibited at Peak Search or Dip Search.
214	Invalid In Sweep-Average.
215	Operation prohibited while Ext.Trig. displayed.
216	Operation prohibited at Calibration.
217	No Write-Trace
220	Operation prohibited at Analysis.
221	Operation prohibited when Application selected.
222	Operation prohibited when WDM Application selected.
223	Operation prohibited when Opt.Amp Application selected.
224	Operation prohibited when Auto PMD selected.
225	Operation prohibited when Pulse Method or WDM Method in Opt. Amp Application selected.
226	Operation prohibited when Spectrum Power selected.
227	Operation prohibited when Peak/Dip Search not performed.
228	Operation prohibited when Area specified as Noise Detection Type.
230	Operation prohibited when Normalize Disp displayed.
231	Operation prohibited when Zone Marker displayed. Turn Zone Marker off.
232	Set Span larger than 0.
233	Operation prohibited at frequency unit. Change unit from frequency to wavelength.

Table B-5 Operation Code (200 to 299) (Cont'd)

Code	Meaning
235	Operation prohibited at Linear Scale. Change Linear Scale to Log Scale.
236	Option Error(**)
238	Operation prohibited when Calculation set for Trace Type. Change Trace Type to setting other than Calculation.
239	Set Display of Active Trace to On.
240	Selected TCP Port Number busy. Change TCP Port Number.
241	Storage Mode enabled only when Write set for Trace Type of active trace
242	Calculation enabled only when calculation set for Trace Type of active trace
243	Trace measurement parameters must be same to calculate between traces.
244	Trace already in use
245	Invalid wavelength
246	Pase enabled only when PLZN Nulling set for Method.

Table B-6 Remote Control Code (–300 to –399)

Code	Meaning
–350	Queue overflow

Appendix C BASIC Sample Program

This appendix describes the sample program in Chapter 3 using the BASIC language.

C.1 Sample Program Operating Environment

The sample program operating environment is as follows.

PC

OS:	Windows XP Professional Service Pack 2
VISA:	NI-VISA Version 4.6
Program tool:	Microsoft Visual BASIC 2008 Express Edition

MS9740A Optical Spectrum Analyzer

GPIB Address:	1
IP Address:	198.168.0.10
Subnet Mask:	255.255.255.0
Terminator Settings:	CR/LF

Installing NI-VISA

To use VISA at Visual BASIC 2008, add the following function at installation.

- Development Support .NET Framework 3.5 Language Support
- NI Measurement & Automation Explore –.NET Framework 3.5 Language Support

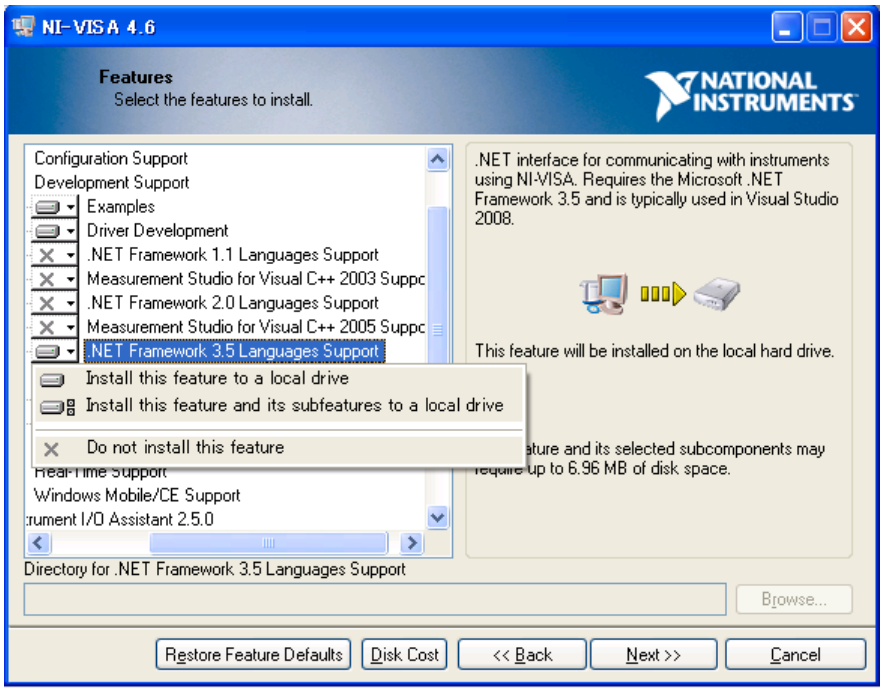


Figure C.1-1 Function Selection Screen at VISA Install

Setting Visual BASIC 2008

To use VISA at Visual BASIC 2008, operate as follows.

1. Click **Add Reference** at the Project menu
2. Click the **.NET** tab in the Add Reference dialog box.
3. Select National Instruments Common and National Instruments VisaNS, and click **OK**.
4. Click **Solution Explore** from the menu list.
5. Double-click **My Project** of Solution Explore.
6. Click **Refer** on the displayed diaplig box.
7. Put checkmarks in the list of imported name spaces for National Instruments Common and National Instruments VisaNS
8. Click **Add** button.
9. Click **.NET** tab on the Add Refernce diaplig box.
10. Select National Instruments Common and National Instruments VisaNS, then click **OK**.

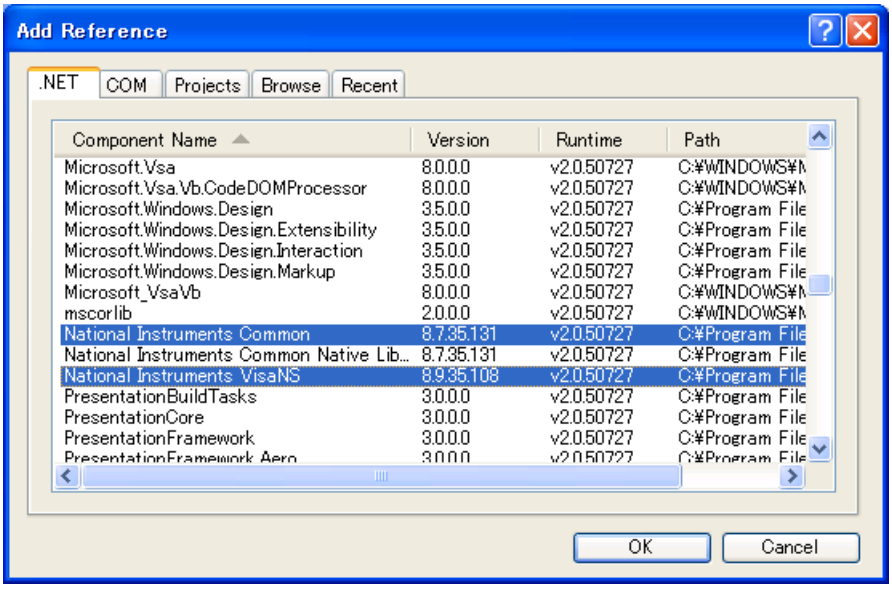


Figure C.1-2 Add Reference Dialog Box

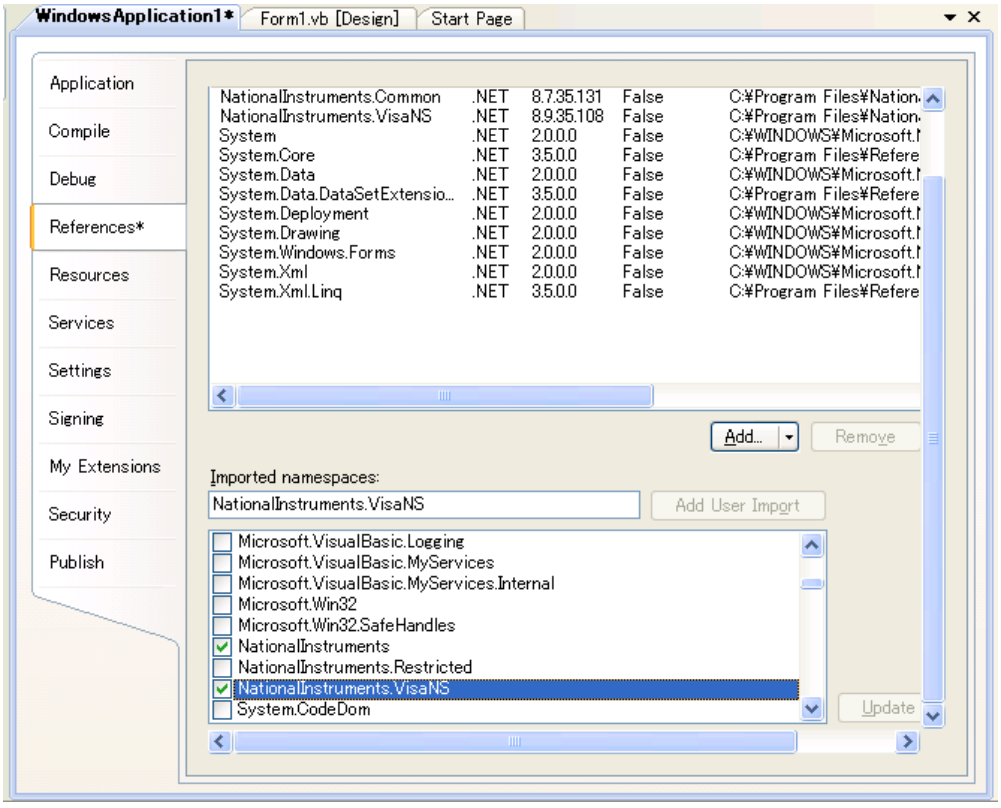


Figure C.1-3 Project Reference Settings

C.2 Example 1: Adjusting Optical System and Calibrating Wavelength

This sample program controls the instrument via the Ethernet interface.

```
Dim tbs As TcpipSession
Dim ret As String

tbs =
CType(ResourceManager.GetLocalManager().Open("TCPIP::192.168.0.10::INSTR"),
TcpipSession)
tbs.Timeout = 30000
tbs.Write("ALIN 1")
tbs.Query("*OPC?")
ret = tbs.Query("ALIN?")
Console.WriteLine(ret)
```

C.3 Example 2: Measuring Center Wavelength and Spectrum Width

This sample program controls the instrument via the GPIB interface.

```
Dim tbs As TcpipSession
Dim ret As String
gbs = CType(ResourceManager.GetLocalManager().Open("GPIB::1::INSTR"),
TcpipSession)
gbs.Timeout = 30000
gbs.Write("ANA ENV,3")
gbs.Write("SSI")
gbs.Query("*OPC?")
ret = tbs.Query("ANAR?")
Console.WriteLine(ret)
```

C.4 Example 3: Reading Trace Data

This sample program controls the instrument via the Ethernet interface.

```
Dim tbs As TcpipSession
Dim ret As String
Dim fno As Integer

tbs =
CType(ResourceManager.GetLocalManager().Open("TCPIP::192.168.0.10::INSTR"),
TcpipSession)
tbs.Timeout = 30000
tbs.Write("SSI")
tbs.Query("*OPC?")
ret = tbs.Query("DMA?")

fno = FreeFile()
FileOpen(fno, "c:\trace.txt", OpenMode.Output)
Print(fno, ret)
FileClose(fno)
```

Appendix D Sample Program without VISA

This appendix describes the sample program without using the VISA.
This sample program controls the instrument via the GPIB interface.

D.1 Sample Program Operating Environment

The sample program operating environment is as follows.

PC

OS:	Windows XP Professional Service Pack 2
Program tool:	Microsoft Visual BASIC 2008 Express Edition
	Microsoft Visual C# 2008 Express Edition

Interface

National Instruments products	GPIB interface
Driver:	NI-488.2 2.6

MS9740A Optical Spectrum Analyzer

GPIB Address:	1
Terminator Settings:	CR/LF

The software attached to the interface provided by National Instruments is used.

Setting at installing GPIB driver

To use GPIB at Visual BASIC/C# 2008, the driver version 2.6 or later is required. Add the following function at installation.

- Development Support .NET Framework3.5 Language Support

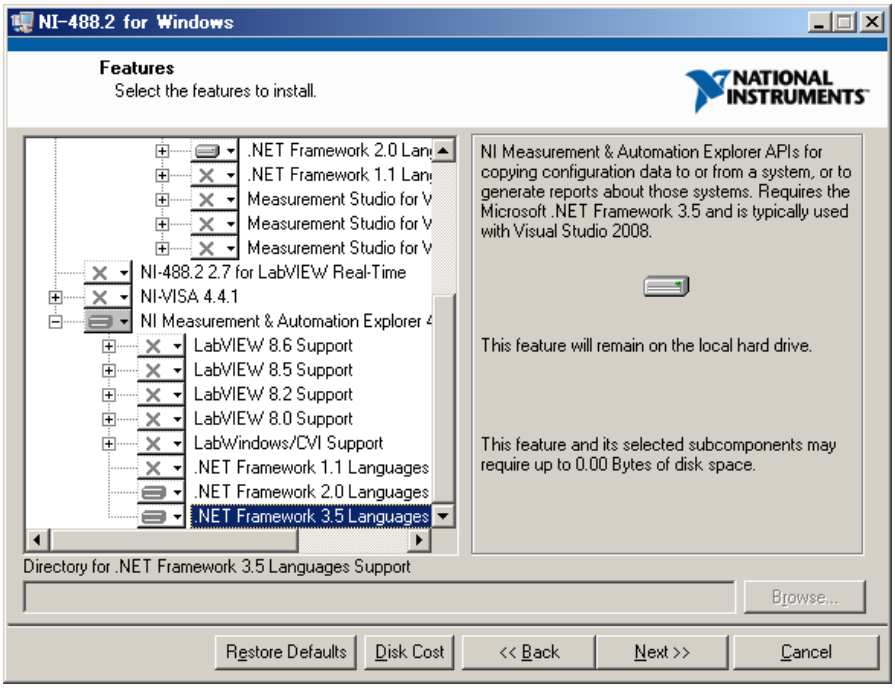


Figure D.1-1 Function Selection Screen at GPIB Install

Setting Visual BASIC 2008

To use GPIB driver at Visual Studio 2005, operate as follows.

Visual BASIC 2008

1. Click **Add Reference** at the Project menu
2. Click the **.NET** tab in the Add Reference dialog box.
3. Select National Instruments Common and National Instruments 488.2, and click **OK**.
4. Click **Solution Explore** from the menu list.
5. Double-click **My Project** of Solution Explore.
6. Put checkmarks in the list of imported name spaces for National Instruments and National Instruments.NI4882.
7. Click **Add**.

Visual C# 2008

1. Click **Add Reference** at the Project menu
2. Click the **.NET** tab in the Add Reference dialog box.
3. Select National Instruments Common and National Instruments 488.2, and click **OK**.

4. Add the below sentence to the program.

```
using NationalInstruments;
using NationalInstruments.NI4882;
```

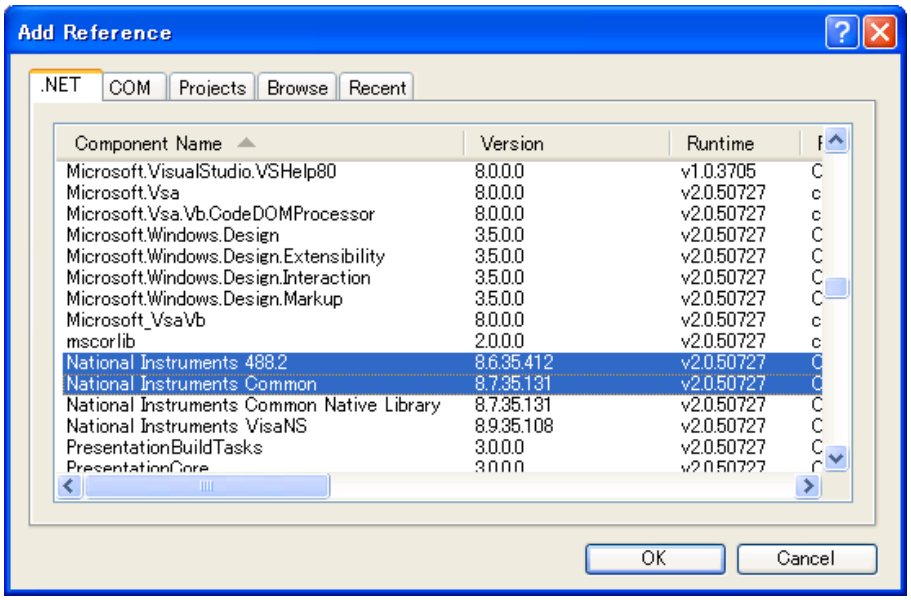


Figure D.1-2 Add Reference Dialog Box

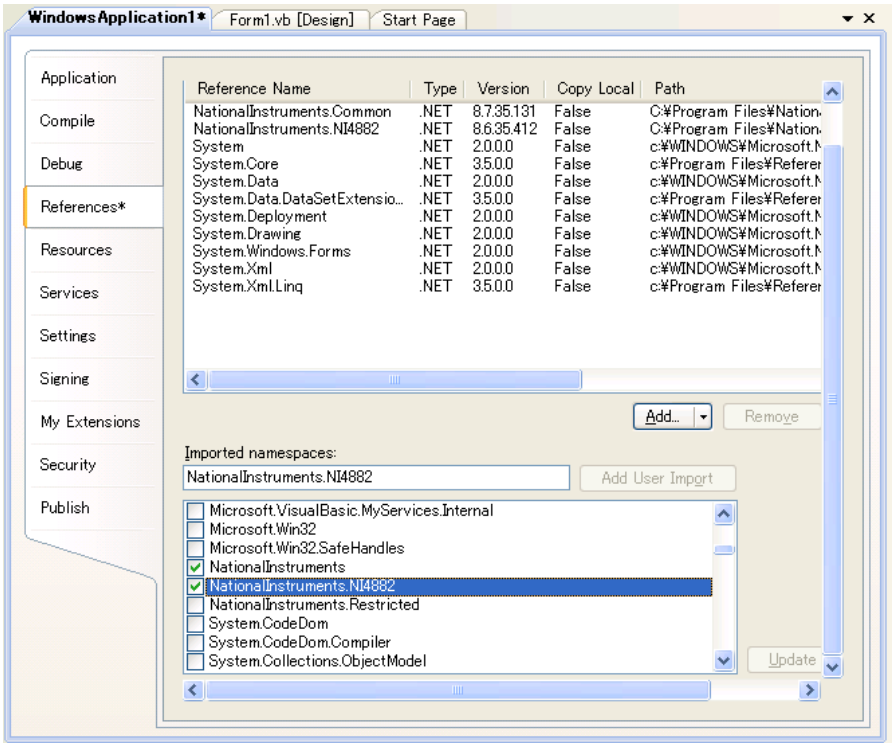


Figure D.1-3 Project Reference Settings (Visual Basic only)

D.2 Waiting Until Measurement Completed by SRQ (Visual C#)

This sample program performs the following processing.

- Executes single sweep and waits until terminated by SRQ
- Captures DFB laser diode measured results

```
NationalInstruments.NI4882.Device ms9740a =
   new NationalInstruments.NI4882.Device(0, 0);

// Set GPIB Address
ms9740a.PrimaryAddress = 1;
// Set timeout
ms9740a.IOTimeout = NationalInstruments.NI4882.TimeoutValue.T100s;

// Set register for SRQ
ms9740a.Write("*ESE 0;*SRE 4;ESE2 1");
// Perform DBF application
ms9740a.Write("AP DFB");
// Clear register
ms9740a.Write("*CLS");
// Start single sweep
ms9740a.Write("SSI");
// Wait for SRQ
ms9740a.Wait(NationalInstruments.NI4882.GpibStatusFlags.DeviceServiceReques
t);
// Serial Poll
NationalInstruments.NI4882.SerialPollFlags flag = ms9740a.SerialPoll();
Console.WriteLine(flag.ToString());
// Read result
ms9740a.Write("APR?");
string ret = ms9740a.ReadString();
// Print result
Console.WriteLine(ret);
```

D.3 Waiting Until Measurement Completed by SRQ (Visual BASIC)

This sample program performs the following processing.

- Executes single sweep and waits until terminated by SRQ
- Captures DFB laser diode measured results

```
Dim ms9740a As New NationalInstruments.NI4882.Device(0, 0)
' Set GPIB Address
ms9740a.PrimaryAddress = 1
' Set timeout
ms9740a.IOTimeout = NationalInstruments.NI4882.TimeoutValue.T100s

' Set register for SRQ
ms9740a.Write("*ESE 0;*SRE 4;ESE2 1")
' Perform DBF application
ms9740a.Write("AP DFB")
' Clear register
ms9740a.Write("*CLS")
' Start single sweep
ms9740a.Write("SSI")
' Wait for SRQ
ms9740a.Wait(NationalInstruments.NI4882.GpibStatusFlags.DeviceServiceReques
t)
' Serial Poll
Dim flag As NationalInstruments.NI4882.SerialPollFlags
flag = ms9740a.SerialPoll()
Console.WriteLine(flag.ToString())
' Read result
ms9740a.Write("APR?")
Dim ret As String
ret = ms9740a.ReadString()
' Print result
Console.WriteLine(ret)
```

Appendix E Bibliography

(1) IEEE488.1-1987 *IEEE Standard Digital Interface for Programmable Instrumentation -Description*

(2) IEEE488.2-1992 *IEEE Standard Codes, Formats, Protocols, and Common Commands for Use With IEEE Std 488.1-1987, IEEE Standard Digital Interface for Programmable Instrumentation -Description*

(3) IEEE802.3-2005 *IEEE Standard for Information technology.*
Telecommunications and information exchange between systems.
Local and metropolitan area networks.
Specific requirements
Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications.

(4) *NI-VISA .NET Framework 2.0 Help*

Index

References are to page numbers.

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